Tables

Exhibits

SECTION 3

Existing Conditions, Environmental Impacts, and Measures to Mitigate Adverse Impacts

This section provides background information on regional and local planning, the built environment, socioeconomic characteristics and trends, archaeological and historical resources, public use land, and the natural environment in the Zoo Interchange study area. This information establishes the context for the proposed improvements and their potential impacts.

This section also identifies the beneficial and adverse social, economic, and environmental effects the Zoo Interchange project may have on resources and conceptual measures to minimize and mitigate adverse effects. Existing conditions and impacts are discussed by resource.

The Zoo Interchange study area is located in Milwaukee County in Wisconsin, and includes the City of Milwaukee, City of Wauwatosa, and the City of West Allis. Geologically, the project corridor is located in an area known as the Eastern Ridges and Lowlands, part of a larger area called the Rock River-Lake Winnebago-Green Bay Lowland, which runs from Wisconsin's southern border to Green Bay. This area was alternately scoured by the advancing movement of glaciers and covered by layers of till left behind when the glaciers retreated (Curtis, 1959; Martin, 1965; Paull, 1977).

Topography in the Zoo Interchange study area is generally flat with gentle changes in elevation. Elevation ranges from approximately 690 feet above sea level along US 45 at Underwood Creek, to approximately 790 feet above sea level along I-894/US 45 at the Greenfield Avenue interchange.

3.1 Land Use and Land Use Planning

3.1.1 Affected Environment

Land Use Planning

SEWRPC provides regional planning on an advisory basis. The following is a summary of key regional and local plans that were not previously summarized in Section 1.3.1:

A Regional Natural Areas and Critical Species Habitat Protection and Management Plan for Southeastern Wisconsin—SEWRPC Planning Report Number 42 (September 1997). In 1997, SEWRPC completed a regional natural areas and critical species habitat protection and management plan. While developing the plan, SEWRPC recognized that urbanization in the region, combined with agricultural activity, has greatly diminished the remaining undisturbed ecological resources. The plan identified the high-quality natural areas, critical species habitats, wetlands, environmental corridors, and significant geological and archaeological sites in southeastern Wisconsin and formulated a recommended plan for the protection, wise use, and proper management of those resources. The plan promotes sound rural and urban development and avoiding unnecessary and costly conflicts between development proposals and resource protection. See Sections 3.11 through 3.18 for information about specific resources in the study area.

A Regional Bicycle and Pedestrian Facilities System Plan for Southeastern Wisconsin: 2010—SEWRPC Planning Report Number 43 (1994) (Amendment to the Regional Bicycle and Pedestrian Facilities System Plan for Southeastern Wisconsin: 2020—SEWRPC Amendment to Planning Report Number 43 [2001]). This system plan provides information on the development of bicycle and pedestrian facilities as part of a comprehensive transportation system for southeastern Wisconsin. See Section 3.26 for information on bicycle routes in the study area.

A Park and Open Space Plan for the City of Wauwatosa, Milwaukee County, Wisconsin—SEWRPC Community Assistance Planning Report Number 207 (1998). This plan identifies the need for additional outdoor recreation sites and facilities in the City of Wauwatosa and ideal locations for these facilities. The purpose of this plan is to help the City, "… guide the preservation, acquisition, and development of land for park, outdoor recreation, and related open space purposes as needed to satisfy the recreational needs of city residents and to protect and enhance the important natural resources within the City."

The plan identified the following areas, near the Zoo Interchange study area, in need of a neighborhood park:

- West of US 45, between North Avenue and Burleigh Street
- Near 116th Street and Gilbert Avenue, approximately 0.3 mile west of US 45—potential location for a 10-acre neighborhood park
- Eisenhower School, approximately 0.2 mile west of US 45, just north of Center Street—proposed as a joint school site-neighborhood park

A Park and Open Space Plan for Milwaukee County (In Progress). An update to Milwaukee County's 1991 Park and Open Space Plan is under development.

Milwaukee Metropolitan Sewerage District (MMSD) 2020 Facilities Plan (2007). The MMSD 2020 Facilities Plan addresses needed and ongoing water pollution abatement for MMSD's planning and sewer service area through the year 2020. The 2020 Facilities Plan is a long-range comprehensive planning document that identifies improvements to all relevant systems so that these systems can accommodate regional growth and protect water resources. The purpose of the 2020 Facilities Plan is to identify the facilities, programs, operational improvements and policies necessary to achieve the water resource goals inspired by the public, as well as those required under state and federal law. See Section 3.11 for a description of key MMSD projects in the study area.

Menomonee River Watercourse Management Plan (2000). This plan includes five projects to manage flooding along the Lower Menomonee River. The project most relevant to the Zoo Interchange study area is a floodwater storage basin and diversion structure east of US 45. The project includes a floodwater diversion structure at Underwood Creek west of US 45; a tunnel under US 45; an outfall basin connected to the tunnel, approximately 0.4 mile east of US 45 on both sides of Swan Boulevard; and an outlet to the Menomonee River. The project also includes rehabilitating Underwood Creek by replacing the concrete-lined channel with natural banks. The rehabilitation area of Underwood Creek is from Highway 100 to its confluence with the Menomonee River, including the portion of the creek under US 45. See Section 3.11.1 for more information on stormwater management in the Zoo Interchange study area.

Other Plans. Municipalities and Milwaukee County guide land use and development in the study area with land use plans that vary in age and detail. WisDOT has reviewed the applicable regional and local land use, development, and conservation plans as part of this study. Section 1.3.1 discusses several of the regional and local plans applicable to the study-area freeway system.

Additionally, the *Zoo Interchange Corridor Study Indirect and Cumulative Effects Report* provides an overview of all relevant regional and local land use plans that are located within or near the study area (WisDOT, 2009a). **Table 3-1** lists relevant regional and local land use plans in place in the study area. Wauwatosa approved a new comprehensive plan in 2008. The plan's transportation element notes the potential reconstruction of the Watertown Plank Road interchange. It also recommends a commuter rail line along the Canadian Pacific Railway tracks under US 45 and a light rail line along the future Hank Aaron State Trail (HAST), with a connection to the Regional Medical Center via the west side of US 45. The Modernization Alternatives would not preclude implementation of the commuter rail or light rail lines in the Wauwatosa comprehensive plan.

TABLE 3-1
Land Use and Development Plans in the Study Area Corridor

SEWRPC Plans
2035 Regional Land Use Plan for Southeastern Wisconsin (2006)
A Regional Transportation System Plan for Southeastern Wisconsin: 2035 (2006)
A Regional Freeway System Reconstruction Plan for Southeastern Wisconsin (2003)
A Transportation Improvement Program for Southeastern Wisconsin: 2009–2012 (2009)
A Regional Natural Areas and Critical Species Habitat Protection and Management Plan for Southeastern Wisconsin (1997)
A Regional Bicycle and Pedestrian Facilities System Plan for Southeastern Wisconsin: 2010 (1994), Amendment to the Regional Bicycle and Facilities System Plan for Southeastern Wisconsin: 2020 (2001)
A Comprehensive Plan for the Menomonee River Watershed (1976)
A Park and Open Space Plan for the City of Wauwatosa, Milwaukee County, Wisconsin (1998)
A Park and Open Space Plan for Milwaukee County (in progress)
City of Milwaukee
A Housing Strategy for the City of Milwaukee (1988)
West Side Area Plan (in progress)
City of Wauwatosa
2020 Comprehensive Master Plan (2008)
City of West Allis
City of West Allis Comprehensive Land Use Plan 1990–2010 (1991)

Existing Land Use

Existing land use in the study area ranges from undeveloped land to high-density urban development. The land uses are commercial, residential, institutional, industrial, parks,

transportation and utilities (**Exhibit 3-1**). Section 3.4, Utilities, Section 3.5, Residential Development, Section 3.6, Commercial and Industrial Development and Section 3.8, Institutional and Public Services provide additional detail on existing land use along the study-area freeway system.

North Leg. The north leg of the Zoo Interchange is a mixture of residential, commercial, industrial, and public uses. The Milwaukee County Zoo parking lot and Zoofari Conference Center are located on the west side of US 45, south of Bluemound Road. Immediately east of US 45, there is a We Energies electrical substation, the 108-unit Parkside Pool apartment complex, and the St. Therese Catholic Church and Milwaukee Montessori School complex. Between Bluemound Road and Wisconsin Avenue, the land use is generally residential, mainly consisting of single-family residences with some multi-unit buildings.

West of US 45 between Wisconsin Avenue and Watertown Plank Road is the 175-acre Milwaukee County Research Park, which is home to more than 70 businesses. East of US 45 between Wisconsin Avenue and Watertown Plank Road, is the 250-acre Milwaukee Regional Medical Center, consisting of multiple health care facilities and related businesses.

Land use on the west side of the freeway, north of Watertown Plank Road, includes the Milwaukee County DPW office and maintenance facility, Milwaukee County Sheriff's Office patrol sub-station, Wisconsin Lutheran College athletic fields, and Underwood Creek Parkway. Milwaukee County's Underwood Creek Parkway, Wil-O-Way Underwood Recreation Center, Hansen Park, DNR's Forestry Science Center, and MMSD's flood storage basin are east of US 45. In this same area, adjacent to US 45, the University of Wisconsin-Milwaukee (UWM) also plans to build an engineering campus.

From Highway 100 to North Avenue, land use is primarily commercial with a residential area located in the southwest quadrant of the North Avenue interchange. Mayfair Mall, the largest commercial development in the study area, is located along Highway 100, just east of US 45 and north of North Avenue, in Wauwatosa. Additional commercial development is located along Highway 100 throughout the study area.

Between North Avenue and Center Street, land use is generally residential. North of Center Street, Wauwatosa West High School is located along the west side of US 45, and Whitman Middle School is located on the east side of US 45. Industrial and warehousing businesses are located near the Burleigh Street interchange.

East Leg. Land use is generally residential along the south side of I-94, from the core of the Zoo Interchange to 84th Street. On the north side, land use is a mix of single-family and multi-family housing and includes the Honey Creek Corporate Center located between 91st Street and 87th Street. St. Charles Youth and Family Services' 7-acre campus is located on the west side of 84th Street, north of I-94, as is a section of the Honey Creek Parkway. The Walter and Olive Stiemke Scout Service Center and a City of Milwaukee fire station are located north of I-94, on the east side of 84th Street. The remaining land use north of I-94 and east of 84th Street is residential. South of I-94, the Wisconsin State Fair Park and Pettit Center are bordered by 84th Street on the west and 76th Street on the east, with residences east of 76th Street.

South Leg. Land use along the south leg of the Zoo Interchange is mostly residential with an American Transmission Company electrical transmission line corridor paralleling the east side of I-894/US 45. The west side of I-894/US 45, between the Zoo Interchange and Greenfield Avenue, is a mostly single-family residential neighborhood with one school/church. Between Greenfield Avenue and Lincoln Avenue, east of I-894/US 45, the land use is primarily single-family residential, while the land use on the west side of the highway is a mixture of residential and light industrial/warehousing activities north of the Union Pacific Railroad tracks and apartment buildings south of the tracks to Lincoln Avenue.

West Leg. The largest individual land use located along the west leg is the Milwaukee County Zoo, which stretches along the north side of I-94 from the Zoo Interchange to the Union Pacific rail line located just east of Highway 100. On the south side of I-94, from the core of the Zoo Interchange west to Highway 100, is a combination of residential land uses, an electrical transmission line corridor, the HAST, and a zoo maintenance facility. A Union Pacific Railroad line runs north-south across I-94, just east of Highway 100. A Colder's appliance and furniture store, a Quad Graphics plant, and a We Energies training center are located south of I-94, between Highway 100 and 116th Street, and land use is mostly industrial west of Highway 100 to the western project limit. On the north side of I-94, between Highway 100 and the west project limit, land use is commercial and residential with Chippewa Park adjacent to the I-94 right-of-way.

3.1.2 Land Use Impacts

Direct Land Use Changes

The direct land use impact of the project will be the conversion of between 57 and 75 acres of land to highway right-of-way. Most of the right-of-way acquired would be strips of land adjacent to the existing right-of-way.

No-Build Alternative. Under the No-Build Alternative, no land use changes would occur.

Modernization Alternatives. Under the Modernization Alternatives, approximately 57 and 75 acres of land would be converted to highway right-of-way. Land acquired would consist of residential, commercial, utility, parks and institutional land. Land use on the remaining parcels of land adjacent to the freeway would likely not change as a result of the proposed action (see Section 3.2, Indirect and Cumulative Effects).

On the east leg, the E1/E3 Hybrid Alternative would require more land than Alternative E1 (8 to 10 acres versus 7 acres). On the south, west, and north legs, the right-of-way acquisition impacts are comparable; however, the 8-lane Modernization Alternatives would require more right-of-way than the 6-lane Modernization Alternatives.

Conformity with Local and Regional Plans

WisDOT and FHWA coordinated with the three cities and Milwaukee County, and the proposed action conforms to relevant local and regional land use plans. Sections 1.3.1 and 3.1.1 summarize relevant local and regional plans prepared by SEWRPC and the cities in the study area. SEWRPC's 2035 regional transportation plan recommends adding capacity to the study-area freeway system.

No-Build Alternative. This alternative does not conform to SEWRPC's *A Regional Transportation System Plan for Southeastern Wisconsin: 2035,* which calls for modernization and capacity expansion of the study-area freeway system.

Modernization Alternatives. Local plans do not address the issues of capacity, safety, or existing highway conditions on the study-area freeway system, but some local plans note the importance of the Zoo Interchange and the study-area freeway system to their community and plan for redevelopment in the study area. The Modernization Alternatives conform to SEWRPC's 2035 regional transportation plan, and do not conflict with local plans.

3.1.3 Measures to Mitigate Adverse Land Use Impacts

FHWA and WisDOT would compensate property owners for land acquired from residences, businesses, utilities, and institutions (see Sections 3.4.3, 3.5.3, 3.6.4, and 3.8.3).

3.2 Indirect and Cumulative Effects

A detailed discussion of both indirect and cumulative effects is available in the *Zoo Interchange Indirect and Cumulative Effects Report* (WisDOT, 2009a). The Code of Federal Regulations (CFR) Title 40 defines indirect and cumulative effects as:

- **Indirect effects** are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to the induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems, including ecosystems (40 CFR § 1508.8).
- **Cumulative effects** are the impacts on the environment, which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time (40 CFR § 1508.7).

3.2.1 Indirect Effects

The indirect effects analysis used the following systematic 6-step approach as outlined in the WisDOT's *Guidance for Conducting Indirect Effects Analysis* (WisDOT, 2007b):

- Step 1—Scoping, selecting activities, and determining the study area.
- Step 2—Inventory the study area and notable features.
- Step 3—Identify the impact causing activities of the proposed project alternatives.
- Step 4—Identify the potentially significant indirect effects.
- Step 5—Analyze the indirect effects and evaluate assumptions.
- Step 6—Assess consequences and identify mitigation activities.

Each step is summarized in the following sections.

Step 1 – Scoping, Selecting Activities, and Determining the Study Area. WisDOT determined that a qualitative approach, based on trend data, local plans, and input from local stakeholders, was appropriate for the indirect effects analysis. Stakeholder interviews with

community development and public works personnel were conducted to collect information about local land use and development trends. A focus group meeting was also conducted on September 25, 2008, to verify the outcomes of the indirect effects analysis. Invitees to the focus group meeting were planners and community development staff from the cities of Milwaukee, Wauwatosa, and West Allis; major land owners, such as the Milwaukee County Research Park and Regional Medical Center; and developers who are active in the area. WisDOT also met with representatives of several minority chambers of commerce to inquire about their plans to develop businesses in the study area.

The study area, or Area of Potential Effects (APE), for the indirect effects analysis is a 1-mile buffer around the study-area freeway system. The area was chosen because it encompasses the residential, commercial, and industrial areas adjacent to the freeway that could be susceptible to change during the planning horizon (20 years after construction, or 2035).

Step 2 – Inventory the Study Area and Notable Features. The APE is a fully constructed and established urban area with a stable population including numerous cultural, recreational, and employment destinations of regional importance. The APE contains the Milwaukee County Research Park and the Regional Medical Center, which are economic drivers for the region, as well as the Milwaukee County Zoo and State Fair Park, which attract hundreds of thousands of visitors each year.

Since very little vacant land is available for new development, communities within the APE are focusing on redeveloping existing commercial and industrial areas that have become underutilized. The communities' efforts, as well as market demand, are creating opportunities for new retail, office, industrial, and residential developments that could diversify and intensify land uses within the APE. According to local officials, communities are preserving existing residential areas.

Since the APE is an urbanized area, the area's remaining natural, biological, and recreational resources generally lie within narrow bands of environmental corridors along Underwood Creek, the Menomonee River, and Honey Creek. Many of the corridors contain public parks and recreation trails. The environmental corridors are owned by Milwaukee County, which preserves these resources.

Steps 3 and 4: Identify Impact Causing Activities of the Proposed Project Alternatives and Identify Potentially Significant Indirect Effects. WisDOT and FHWA reviewed the 6- and 8-lane Modernization Alternatives, including the various leg and core alternatives, to determine which elements have the potential to cause indirect effects. A list of reasonably foreseeable indirect effects of the Modernization Alternatives is provided below. The next section, Step 5, evaluates the likelihood these affects could occur for the Modernization Alternatives and compares those effects to the No-Build Alternative.

- Modernizing the freeway is likely to facilitate planned development overall within the APE.
- A new eastbound North Avenue exit from northbound US 45 is likely to facilitate planned development.
- New service roads and new direct access roads to the Milwaukee County Research Park and the Regional Medical Center are likely to facilitate planned development.

- Freeway capacity increase and changes to local road traffic could indirectly affect neighborhoods and business environments.
- Some direct access from the existing interchanges would be replaced with service roads that would provide less direct access, indirectly affecting local economic development decisions.
- The encroachment of the freeway could indirectly affect residential, commercial, and natural resource areas.

Step 5 – Analyze the Indirect Effects and Evaluate Assumptions. WisDOT and FHWA reviewed the following indirect effects that are likely to occur as a result of the transportation alternatives proposed for the Zoo Interchange project.

Growth Inducing Effects. Planned development within the APE is likely to happen regardless of the chosen alternative for the Zoo Interchange project. This was confirmed with participants at the September 2008 focus group meeting. However, the participants acknowledged that the freeway is highly interconnected with local land use, and the reconstruction of the freeway could either hinder or facilitate local economic development depending on the alternative selected.

Focus group participants generally felt the No-Build Alternative is likely to hinder the economic development potential within the APE because access to local destinations would become increasingly difficult due to increasing congestion. On the other hand, focus group participants generally felt the 8-lane Modernization Alternative is most likely to facilitate planned economic development within the APE because the additional travel lanes more effectively addresses traffic congestion compared to the other alternatives. The 6-lane Modernization Alternative is also likely to facilitate economic development by improving safety and some traffic operations. However, focus group participants generally agreed it would have less growth inducing effects compared to the 8-lane alternative because traffic congestion would continue to increase, discouraging people and businesses from using the corridor.

The following specific areas within the APE were reviewed to determine if certain aspects of the transportation alternatives are likely to cause growth inducing indirect effects:

- State Fair Park. State Fair Park has considered selling a portion of their parking lot along I-94 for private development. Both Alternative E1 and the E1/E3 Hybrid Alternative requires additional right-of-way to accommodate the service roads proposed between 84th and 76th streets, which would reduce the amount of land State Fair Park could sell in the future. These alternatives are likely to change future development plans.
- Highway 100 Interchange. The Highway 100 interchange with I-94 will be reconstructed as a full service interchange with the same level of access under all Modernization Alternatives; therefore, growth inducing effects related to the reconstruction are not likely.
- North Avenue Interchange. A North Avenue interchange sub-alternative would provide direct access to eastbound North Avenue from US 45 for the first time. The new access is likely to indirectly facilitate planned development and improve the redevelopment potential of the Highway 100 corridor. However, this effect is not likely to be substantial since eastbound North Avenue is already accessible from the adjacent Highway 100/Mayfair Road exit.

- Milwaukee County Research Park and Milwaukee Regional Medical Center. The Modernization Alternatives propose a system of service roads and new direct access roads that would facilitate access to the Research Park and the Regional Medical Center. These new roads are likely to indirectly facilitate existing and planned development at these facilities by reducing traffic congestion and improving access. The Regional Medical Center plans an additional 4 million square feet of development within the next 15 years. Without added access, the capacity of the current roadway system (as well as local land use regulations) could place limitations on the future development in this area. In addition, the Milwaukee County Mental Health Complex is considering relocating, which could open up 45 acres of land on the southeast quadrant of the Watertown Plank Road/US 45 interchange. The market demand for this site is high, and the Regional Medical Center is interested in constructing additional facilities if the land becomes available.
- Bluemound Road Corridor. Access to and from Bluemound Road via I-94 would be less direct under the Modernization Alternatives. Some participants at the September 2008 focus group meeting felt this could hinder business development along the Bluemound Road corridor. However, the indirect effect is not likely to be substantial because alternate access is provided in close proximity at 84th Street, Highway 100, Watertown Plank Road, and Wisconsin Avenue.
- Greenfield Avenue Corridor. Participants at the September 2008 focus group meeting felt alternatives that provide less direct access to Greenfield Avenue from eastbound I-94 via I-894/US 45 may indirectly affect economic development in West Allis, since Greenfield Avenue is an important link to the community. The sub-alternative that maintains full access to Greenfield Avenue from eastbound I-94 would facilitate West Allis' planned development.

Local Road Traffic Effects. Indirect effects related to changing local road traffic patterns are discussed below.

- Freeway Capacity Effects. The lack of capacity on the freeway system places greater pressure on local arterial roads to carry regional traffic, which indirectly affects local traffic operations and the quality of the local business environment along arterials. This was confirmed at the focus group meeting where participants felt the No-Build Alternative is likely to have the greatest effect on local arterials because regional traffic would continue to increase as the freeway system becomes more congested. The 6-lane Modernization Alternative is likely to provide some operational improvements along the freeway, but traffic break downs (level of service F) would continue, encouraging drivers to continue to use local arterial streets as alternative routes. The 8-lane Modernization Alternative would add new capacity to the study-area freeway system and make operational improvements that would maintain a level of service D or better on the freeway during peak travel times. As a result, this alternative would provide the most relief to the local arterial road system by encouraging regional traffic to stay on the freeway system.
- Reduced Access to/from I-94 and Bluemound Road. The reduced access to/from I-94 and Bluemound Road and Wisconsin Avenue via US 45 under all Modernization Alternatives would increase traffic on other local arterials such as 84th Street, Highway 100, and Watertown Plank Road. Participants at the September 2008 focus group were concerned that increased traffic could increase the need to expand local roadways in the future.

- Service Roads Between 84th and 76th Streets. Under Modernization Alternative E1 the proposed service roads adjacent to I-94 between 76th and 84th streets would increase traffic on 76th Street between I-94 and Greenfield Avenue by 14 percent (14,000 vpd to 16,000 vpd) compared to the No-Build Alternative. This could indirectly affect the quality of life for residents along this corridor. However, this effect is not expected to be substantial. Residences along 76th Street are already affected by a relatively higher traffic volume because the street is a main arterial and it is adjacent to State Fair Park. Also, access to 76th Street from I-94 by the proposed service roads under E1 would be similar to exiting conditions. The street currently has access to I-94 by way of frontage roads and local roads that connect with the 84th Street and 70th Street interchanges with I-94. Furthermore, traffic analysis has determined traffic operations (level of service) will remain acceptable along 76th Street under the E1 Modernization Alternative.

  Traffic increases along 76th Street are also expected under the No-Build Alternative, which could affect the quality of life along this corridor. On the other hand, the E3 Modernization Alternative would reduce traffic along 76th Street by 17 percent in comparison to the No-Build Alternative, which could improve the quality of life for residences along 76th Street.

Neighborhood Encroachment Effects. On the east leg of the study area, residences south of I-94, west of 84th Street, would be directly affected by acquisitions and relocations. (See Section 3.5 for more information on residential acquisitions.) I-The neighborhood has a relatively small number of homes between I-94 and a large manufacturing plant to the south. As a result, the area's quality of life could be indirectly affected by the property acquisitions that decrease the number of people in the neighborhood. The E1/E3 Hybrid Alternative (both 6 and 8 lanes) would have the greatest effect on the neighborhood since it requires the largest number of residential acquisitions. Modernization Alternative E1 (both 6 and 8 lanes) would not affect the neighborhood on the east leg nor would the No-Build Alternative because no residences would be acquired.

Five to 11 residences would also be directly affected by relocations from the core and south leg under all the 6- and 8-lane Modernization Alternatives. Since the residences adjacent to the south leg are part of a larger neighborhood, the Modernization Alternatives are less likely to indirectly affect their long-term integrity.

Business Encroachment Effects. The 6- and 8-lane Modernization Alternatives would acquire 5 to 7 businesses, with associated job loss, unless the businesses relocate within the study area. (See Section 3.6 for more information on business acquisitions.) This is not likely to indirectly affect the local economy because some job losses could be offset by businesses being relocated within the study area. Also, the Modernization Alternatives are expected to strengthen local economic conditions by facilitating planned development within the study area. Furthermore, the area is attractive to economic development due to its proximity to the freeway system and its central location in the metropolitan area. The No-Build Alternative would not require the acquisition of businesses and, therefore, would not cause indirect effects.

Encroachment on Natural Resources. Indirect effects to natural resources are not likely under the Modernization and No-Build Alternatives. The APE is a fully built out urban area that has placed its remaining natural resources in public ownership to ensure their preservation. One remaining undeveloped area is located on the northeast quadrant of the Milwaukee County grounds. According to the land use plan for this area, the western side is planned for

development, including the UWM engineering campus. The remaining undeveloped areas will be preserved for the DNR Forestry Science Center and open space. As a result, any development that is induced by the Modernization Alternatives would be directed to areas planned for development or redevelopment.

Step 6 – Assess Consequences and Identify Mitigation Activities. The consequences of the indirect effects discussed above and mitigation measures for those effects are discussed below.

Growth Inducing Effects. The communities within the APE are actively planning and promoting the redevelopment of existing commercial and industrial areas. The redevelopment of these areas is likely to happen regardless of the selected alternative for the Zoo Interchange. However, local officials have acknowledged that 1) the Zoo Interchange corridor is highly connected to local economic development goals, and 2) the reconstruction and modernization of the Zoo Interchange corridor is important to maintain the area's regional competitiveness.

The majority of community representatives from the study area feel that development which may be induced by the Modernization Alternatives, if planned, would be positive for their communities by helping implement their land use plans and economic development goals. Planned development would also increase the local tax base and help pay for the cost of public services that are already in place. Furthermore, development that occurs on lands that have been previously developed would not diminish the amount of green space in the APE or affect the area's remaining natural resources that are preserved by public ownership. New development or redevelopment could increase the intensity of land uses in some areas and create additional traffic on local streets, as well as increase impervious area.

To minimize negative effects of induced development, local communities have a number of tools available. A key tool is developing and implementing land use plans to direct future land use and developing zoning ordinances that support land use plans. All communities within the APE have community development departments, plan commissions, and zoning regulations in place. They also have comprehensive plans or are in the process of developing comprehensive plans. Additionally, local regulations are in place to control stormwater runoff.

To further support local regulations and policies, state and federal regulations help manage impacts to natural resources such as wetlands (DNR Chapter 30 permits and the Corps Section 404 permits), water quality (NR 151), and threatened and endangered species (NR 27 and Endangered Species Act).

Local Road Traffic Effects. Traffic patterns on local streets could change as a result of the reconstruction of the Zoo Interchange. Specifically, the reduced access to/from I-94 and Bluemound Road to/from US 45 would increase traffic on other local arterials such as 84th Street, Highway 100, and Watertown Plank Road. As discussed previously, participants at the September 2008 focus group were concerned this could cause a need to expand local roads. Local roadway expansion could lead to property acquisitions, as well as local land use changes, which could be offset by the modernization of the freeway. The increased capacity under the 8-lane Modernization Alternative would improve traffic flow through the study-area freeway system and decrease regional traffic volumes on local streets in comparison to the No-Build Alternative.

The increase in traffic along 76th Street associated with Modernization Alternative E1 could indirectly affect the quality of life for residents, which could lead to decreased property

investment over time. As discussed previously, this affect is not expected to be substantial since residents along this corridor are already affected by relatively high traffic volumes and future access to I-94 would be similar to existing conditions.

WisDOT will work with local communities to implement mitigation measures to address potential traffic increases that may occur during and after construction. Measures may include improved signal timing and signing, improved signal hardware, removing on-street parking, and other minor operational improvements to local roads. Local governments are also taking measures to minimize the impacts to local streets by using zoning and other land use planning tools to control the location and size of developments.

Neighborhood Encroachment Effects. As discussed in the previous section, the 6- and 8-lane E1/E3 Hybrid Alternatives are likely to affect the quality of life in the neighborhood south of I-94, on the east leg, by acquiring residential property due to reconstruction of the Zoo Interchange. The City of Milwaukee has expressed a concern that loss of residences in this area could make it difficult to maintain home ownership rates of the remaining homes, which could lead decreased investment in the area over time.

WisDOT is continuing to refine the design of the Zoo Interchange to further avoid and minimize impacts to residential areas and neighborhoods. Mitigation measures for unavoidable impacts to neighborhoods could be developed through community sensitive design.

Business Encroachment Effects. There will be no adverse indirect effects to the businesses within the APE as a result of encroachments, and no mitigation measures are required.

Natural Resource Encroachment Effects. The remaining natural resources within the APE are owned and protected by Milwaukee County, and are not likely to be indirectly affected by the Zoo Interchange project or other development that is facilitated by the Modernization Alternatives.

3.2.2 Cumulative Effects

Based on the anticipated direct and indirect project effects, the following resources were reviewed for potential cumulative effects within the project corridor:

- Environmental corridors and stream crossings
- Wetlands and floodplains
- Surface water quality
- Threatened and endangered species
- Commercial areas
- Historic properties
- Public parks and open space
- Neighborhoods
- Air quality

Area of Potential Effect

The APE for cumulative effects varies depending on the resource discussed. **Table 3-2** summarizes the resources reviewed in this document within the APE. The APE includes the Zoo Interchange corridor, but also considers the geographic boundaries for resources that are larger than the project corridor.

TABLE 3-2
Area of Potential Effects by Resource

Resource	Area of Potential Effects
Environmental corridors and stream crossings	Counties in which the environmental corridor or stream crossing is located
Wetlands and floodplains	The counties in which the wetland or floodplain is located
Surface water quality	Menomonee and Root River watersheds
Threatened/endangered species	Extent of the habitat that supports the species
Commercial areas	Properties within the immediate vicinity of the Zoo Interchange corridor
Historic properties	Properties within the immediate vicinity of the Zoo Interchange corridor
Public Parks and Open Spaces	Properties within the immediate vicinity of the Zoo Interchange corridor
Neighborhoods	Neighborhoods and local roads within immediate vicinity of the Zoo Interchange corridor
Air Quality	Southeastern Wisconsin region

Past, Present, and Reasonably Foreseeable Future Actions

Given the history of development around the project corridor and the existing demand for new development, there are many past, present and reasonably foreseeable future actions that may contribute to cumulative impacts within the APE. **Table 3-3** provides a list of the other actions, that when considered with the Zoo Interchange project may have cumulative effects on the environment.

TABLE 3-3
List of Past, Present, and Reasonably Foreseeable Future Actions

Action	Location
Past / Present	
Historic urban and suburban development	Milwaukee County
Canadian Pacific and Union Pacific Rail and other rail development	Milwaukee County
Construction of US 45, I-94, and I-894	Milwaukee County
Development at the Milwaukee Regional Medical Center, Milwaukee County Grounds, the Milwaukee County public works facility, and Milwaukee Lutheran College athletic facility	Near Watertown Plank Road/US 45 interchange
Milwaukee County Zoo	NW quadrant of Zoo interchange
Milwaukee County Research Park	SW quadrant of Watertown Plank Road/US 45
Milwaukee County DPW facility	NW quadrant of Watertown Plank Road/US 45
MMSD flood management facilities	Milwaukee County Grounds and Underwood Creek
Underwood Creek rehabilitation	Between Highway 100 and confluence with Menomonee River
Wisconsin State Fair grounds	84th Street/I-94 interchange

TABLE 3-3
List of Past, Present, and Reasonably Foreseeable Future Actions

Action	Location
Honey Creek Business Park	84th Street/I-94 interchange
Redevelopment of former Allis Chalmers site and other former industrial sites	City of West Allis
I-94 north-south reconstruction	Milwaukee, Racine, and Kenosha counties
Marquette Interchange reconstruction	Milwaukee
Future	
Continuing redevelopment at the Milwaukee Regional Medical Center	SE quadrant of Watertown Plank Road/US 45 interchange
Continuing redevelopment at Milwaukee Research Park	SW quadrant of Watertown Plank Road/US 45 interchange
Potential redevelopment of Milwaukee County public works facility	NW quadrant of Watertown Plank Road/US 45 interchange
Potential development in Economic Development Zone on Milwaukee Grounds	NE quadrant of Watertown Plank Road/US 45 interchange
Continued redevelopment of former industrial sites	City of West Allis
Future SE Wisconsin freeway reconstruction	Milwaukee County

Cumulative Effects Analysis and Environmental Consequences

The analysis considered the existing condition of each resource and the consequences of the anticipated cumulative effects. Modifying alternatives to avoid, minimize, or mitigate the effects was also discussed. The findings of the analysis are summarized by resource in the following sections.

Environmental Corridors and Stream Crossings

Environmental corridors, which are usually associated with streams, are unique resources within the APE that represent some of the most substantial natural areas in a highly urbanized environment. Therefore, local municipalities seek to protect these resources from further encroachment through zoning and permitting regulations. The majority of environmental corridors are also publicly owned to ensure their preservation. Historically, past land development has affected environmental corridors throughout the region.

The alternatives for the Zoo Interchange project are not likely to cumulatively affect environmental corridors and stream crossings. All Modernization Alternatives will maintain the two existing crossings over the Underwood Creek environmental corridor and one adjacent to the Honey Creek environmental corridor, but no additional crossings are proposed. Potential temporary effects from construction would be avoided and minimized by using WisDOT's *Standard Specifications for Road and Bridge Construction* (2009b) and complying with Wisconsin's TRANS 401 regulations that oversee construction site erosion control and stormwater management. Local governments would continue to be responsible for regulating development that could affect environmental corridors through land use policies, zoning, and permitting regulations.

Wetland and Floodplain

Wetland filling and dredging from past urban development, including the original construction of the Zoo Interchange and continuing development in the study area, are the primary causes of wetland loss and degradation in the study area. Similarly, urban development in floodplains has reduced flood storage capacity. As a result, less wetland and floodplain remain to improve water quality, control flooding, provide wildlife habitat, and provide aesthetic appeal. Degradation from past activities also allows aggressive, non-native species to repopulate degraded wetlands, which contributes to poor floristic quality of disturbed wetlands throughout the APE. Since early settlement years, wetlands in Milwaukee and Waukesha counties have declined by 70 and 26 percent, respectively (SEWRPC, 1997).

Some activities are occurring within the APE that could improve flood storage and habitat. MMSD's flood management facility is under construction on the Milwaukee County grounds and is expected be completed by 2011. The facility is expected to minimize flooding along the Menomonee River by providing approximately 316 million gallons of flood storage. In addition, the rehabilitation of Underwood Creek, between Highway 100 and its confluence with the Menomonee River, will improve natural floodplain functions and help re-establish wetlands along this reach of the creek, which flows under US 45. The first phase of the Underwood Creek rehabilitation (Highway 100 to US 45) will be done in 2010. Construction of the remaining segments has not been scheduled.

State and federal laws regulate filling and dredging in wetland, and floodplain filling on all development projects. The goal of the regulations is to avoid net loss of wetland and maintain floodplain functions. In addition, local zoning regulations manage the cumulative effect of wetland losses and the development of floodplains from changes in land use. Local zoning includes wetland protection measures and limits floodplain development for all communities within the APE. Thus, further wetland and floodplain loss or degradation from present and future developments can be avoided, minimized, or mitigated.

Reconstructing the Zoo Interchange would impact 1.0 to 1.7 acres of wetland. Section 3.15 summarizes wetland avoidance and minimization measures that WisDOT and FHWA have implemented or plan to implement. Wetland impacts of the Zoo Interchange reconstruction would be managed according to the *Wisconsin Department of Transportation Wetland Mitigation Banking Technical Guideline* (WisDOT, 2002). The guideline establishes how unavoidable impacts are mitigated either in the project corridor, offsite, or at a mitigation bank. Mitigation will occur at either a new onsite mitigation site or at an established offsite wetland mitigation bank. After a preferred alternative is selected, the exact wetland impact is quantified. Then, WisDOT and FHWA will finalize mitigation and monitoring measures for wetlands. (The guideline and the WisDOT/DNR Cooperative Agreement require monitoring.)

Potential cumulative effects from short-term highway construction in floodplains would be avoided and minimized by using WisDOT's *Standard Specifications for Road and Bridge Construction* (2009b) and implementing any additional measures deemed necessary through ongoing coordination with DNR.

Local governments would be responsible for monitoring compliance with zoning and land use regulations that manage and protect wetland and floodplain resources. Furthermore, federal and state wetland laws require monitoring commitments of all permitted activities that include wetland mitigation of unavoidable direct impacts.

Surface Water Quality and Quantity

Section 3.11 identifies the relationship between the non-point sources of water pollution from urban development and the resulting decline of water quality in the study-area watersheds. Section 3.11 notes that the Modernization Alternatives would increase impervious area on various legs by between 30 and 50 percent over the existing study-area freeway system. In an April 2008 letter, MMSD stated concern over potential increase in impervious surface area as it relates to increased stormwater runoff (see Appendix D, page D-61). While runoff volumes would increase under the Modernization Alternatives, the water quality analysis notes that using best management practices would reduce the level of pollutants in stormwater runoff compared to the existing conditions.

Current and future land development could cumulatively impact water quality despite any improvements implemented during reconstruction of the Zoo Interchange. For example, the planned expansion at the Regional Medical Center could add 4 million square feet of new development over the next 10 to 15 years and UWM plans to build an engineering campus at the northeast quadrant of the Watertown Plank Road/US 45 interchange. Increased impervious area from these developments would increase the likelihood of stormwater carrying sediment and other pollutants in streams that are already heavily degraded from historic urbanization.

As discussed in Section 3.11, WisDOT and FHWA are evaluating several best management practices to minimize the amount of runoff that enters water bodies, reduces flow velocity, and improves the water quality of the runoff. The use of retention/detention basins to manage stormwater from the proposed improvement is being evaluated along all legs of the Zoo Interchange project.

To mitigate the impact of non-point source runoff, DNR implemented NR 151, which sets performance standards for stormwater quality control measures. For example, 80 percent of the total suspended solids from site runoff must be removed on new construction sites 1 acre or larger. After construction, permanent measures must be in place to continue removing 80 percent of total suspended solids in stormwater runoff from the site. By 2013, local governments must implement stormwater management measures to remove 40 percent of the total suspended solids discharged from their storm sewers. Best management practices required under stormwater and non-point runoff rules are expected to improve water quality as future projects and ongoing redevelopment occur.

Short-term highway construction impacts to water quality would be avoided or minimized by using WisDOT's *Standard Specifications for Road and Bridge Construction* (2009b) and complying with Wisconsin's TRANS 401 regulations that regulate construction site erosion control and stormwater management.

DNR and local governments are responsible for monitoring the performance of stormwater management measures and making corrective actions for non-WisDOT projects. WisDOT will monitor its performance measures through its WisDOT/DNR Cooperative Agreement (Memorandum of Understanding on Erosion Control and Stormwater Management). The Zoo Interchange reconstruction would implement best management practices for stormwater and monitoring performance and, therefore, would not cumulatively contribute to water quality impacts.

Threatened and Endangered Species

Urban development is the primary cause of the loss and fragmentation of Butler's garter snake habitat in the APE (see Section 3.18). Habitat degradation (including wetland degradation) reduces and isolates species in remaining habitats.

Along with impacts from past, present, and anticipated future actions, the Zoo Interchange reconstruction and other foreseeable actions could impact the Butler's garter snake by reducing habitat on the north leg and west leg. State laws regulate impacts to the species, but no state or federal permits are required. No other threatened or endangered species impacts are anticipated. Local governments can manage the cumulative effect of other land development actions through existing land use and zoning regulations. Communities in the study area have zoning regulations that limit development along waterways and conservation areas, which are typically environmental corridors and isolated natural areas where Butler's garter snakes may be present.

Section 3.18 summarizes the measures developed by WisDOT and DNR to avoid, minimize, and mitigate impacts to the Butler's garter snake. Utilizing these measures, WisDOT will minimize the potential for cumulative impacts to the Butler's garter snake. A conservation plan for the Butler's garter snake (if required) may include monitoring. Local governments can further manage direct effects of other developments and potential indirect effects from the project through local plans and zoning regulations.

Commercial Areas

The Milwaukee region has historically been an economic hub in Wisconsin, providing a stable employment base for the region. While both Milwaukee and Waukesha counties have seen continued job growth between 1980 and 2000, Milwaukee County employment grew at a much slower rate (7 percent) than Waukesha County (104 percent). Slower growth in Milwaukee County can be attributed to a number of factors such as mature land use patterns and a decline in large-scale manufacturing employment, historically located in Milwaukee County. The area around the Zoo Interchange is the focus of substantial economic activity. Part of the economic vitality of the project area is due to its close proximity to the freeway system, a large employment base, and other transportation infrastructure, including the airport and transit system.

The Modernization Alternatives would require acquisition of 5 to 7 businesses. While removing commercial buildings within the Zoo Interchange footprint will have a direct impact, the overall adverse impact to commercial areas is not expected to be substantial. Modernizing the study-area freeway system is expected to maintain access and improve safety and traffic circulation, which would have a positive cumulative effect on jobs within the area. In addition, vacant space is available within the region to relocate businesses. Milwaukee and Waukesha counties had retail vacancy rates of 6.9 percent and 6.7 percent, respectively, in 2007 (CoStar Group, 2008a). Office vacancy rates were 10.4 percent for Milwaukee County and 11.7 percent for Waukesha County in 2007 (CoStar Group, 2008b). WisDOT's acquisition and relocation program would avoid and minimize potential negative cumulative affects for affected businesses (see Section 3.6).

Historic Properties

Ongoing development and redevelopment could potentially affect historic resources through demolition or alterations that affect the property's historic integrity. Both federal and state laws help protect properties that are eligible for, or listed in, the National Register of Historic Places. These laws require sponsors of state and federally funded projects to consult with the State Historic Preservation Office (SHPO). However, these laws do not always apply to privately initiated actions that could affect historic resources where neither federal nor state permits or approvals are required. In addition to state and federal historic properties, local governments take measures to protect properties that are historically significant to their communities. To help avoid and minimize impacts to locally designated historic properties, the cities of Milwaukee, West Allis, and Wauwatosa have historic preservation commissions to review plans and make recommendations prior to local approval.

If the Union Pacific rail bridge over I-94 needs to be realigned from its current location, the Zoo Interchange project could require the replacement of the Union Pacific Railroad truss bridge just south of I-94, which is eligible for listing on the National Register (see Section 3.25). If WisDOT and FHWA determine the bridge does not need to be realigned, the Zoo Interchange project would likely not affect the truss bridge.

If the truss bridge is adversely affected, WisDOT and FHWA will continue to coordinate with State Historic Preservation Officer to identify appropriate mitigation measures to minimize cumulative impacts to historic resources. These mitigation measures will be documented in the Final EIS.

Parks and Open Space

Parks and open space within the APE are publicly owned and protected from private development. As discussed in Section 3.26, all the Modernization Alternatives would require strip acquisitions from the following parks:

- Milwaukee County Zoo—All alternatives would affect approximately 15 acres, including the zoo maintenance facility, the Zoofari Conference Center, and the over flow parking lot. The zoo's animal exhibit area would not be affected.
- Chippewa Park—The 6- and 8-lane W3 Alternative would affect 0.1 and 0.2 acre, respectively, of this park on the west leg.
- Underwood Creek Parkway—All alternatives would affect up to 0.2 acre.
- Wil-O-Way Underwood Recreation Center—All alternatives would affect up to 0.5 acre.

Section 4 provides additional information on Section 4(f) resources. **Exhibit 4-1** shows the location of all parks in the area; **Exhibit 4-2** shows the impacts to Wil-O-Way; **Exhibit 4-3** shows the impacts to Underwood Creek Parkway; **Exhibit 4-4** shows the impact to the Milwaukee County Zoo; and **Exhibit 4-5** shows the impact to Chippewa Park.

WisDOT has taken measures to minimize impacts to parkland. Measures include constructing entrance and exit ramps as close to the mainline freeway and using retaining walls will minimize the right-of-way needs of the project. WisDOT continues to coordinate with Milwaukee County to develop additional mitigation measures to maintain and enhance parkland through community sensitive design measures. Section 4 and

Appendix A contain detailed discussions of the mitigation measures. These measures would minimize the Zoo Interchange's cumulative effect on parks and open spaces.

Neighborhoods

Maintaining infrastructure is important to a community's quality of life. Highways and other transportation infrastructure generally provide reliable access to employment and cultural centers and improve mobility of people and goods—both of which encourage continued investment throughout the community and within neighborhoods.

Conversely, infrastructure in and adjacent to neighborhoods can cause direct and proximity impacts such as right-of-way acquisition, relocations, and increased air, noise, and visual impacts. The combination of these impacts can decrease quality of life and cause disinvestment in neighborhoods. Neighborhoods close to large infrastructure systems become more vulnerable to these impacts as the infrastructure expands. Small impacts from individual projects can cumulatively contribute to neighborhood decline.

The Zoo Interchange reconstruction would not divide neighborhoods, but the Modernization Alternatives would affect between 6 and 32 residences. The anticipated impact is not substantial compared to the overall population in Milwaukee, Wauwatosa, and West Allis. However, there is a potential cumulative impact to neighborhoods where past and future freeway construction has and could occur. The City of Milwaukee is particularly concerned about the future reconstruction of the southeast Wisconsin freeway system, noting the vulnerability of neighborhoods that are subjected to the cumulative adverse impacts of expanding highways. Also, residential areas along 76th Street, between I-94 and Greenfield Avenue, could be cumulatively affected by projected traffic increases from Modernization Alternative E1, State Fair Park events, and potential redevelopment of State Fair Park land.

Milwaukee, Wauwatosa, and West Allis would experience loss of tax base (see Section 3.9), representing a fraction of 1 percent of the tax base. The Modernization Alternatives could offset this impact by enhancing and facilitating the planned development potential in the APE.

WisDOT has modified the project design to avoid and minimize relocations to the extent possible. Community sensitive design is used to further minimize impacts, enhance infrastructure elements, and improve the visual quality of Zoo Interchange. WisDOT and local communities can incorporate similar design and community sensitive design techniques into future infrastructure projects to improve neighborhood quality of life and minimize traffic impacts.

Air Quality

The Zoo Interchange alternatives, along with other activities and developments in the study area, may have a cumulative impact on air quality in the region. Other activities in the region such as the new Oak Creek coal-fired power plant expansion and continued regional traffic growth are sources of air pollutants. By the year 2035, average weekday traffic in the Zoo Interchange study area is expected to increase by 18 percent. While the southeast Wisconsin region is in attainment for most criteria pollutants, the 8-hour ozone standard is in non-attainment and U.S. EPA plans to classify Milwaukee County as non-attainment for particulate matter in 2009. Current and future development in the region has the potential to continue to impact air quality.

DNR manages, monitors, and enforces air quality programs in Wisconsin. To help manage the air quality program, DNR works with a range of industries, agencies, interest groups, and individuals to develop the State Implementation Plan (SIP) that demonstrates how Wisconsin will attain compliance with national air quality standards. FHWA also provides congestion management and air quality grants for transportation projects in non-attainment areas that will reduce transportation-related air emissions.

Ultimately, U.S. EPA plays a major role in managing Wisconsin's compliance with the Clean Air Act, which includes monitoring the SIP. If the state and southeast Wisconsin region cannot achieve attainment standards, U.S. EPA can impose sanctions, such as stricter emissions rates for new developments and withholding federal funds for transportation projects.

To obtain federal funding, the reconstruction of the Zoo Interchange must be included in transportation plans that conform to the SIP. At the regional level, SEWRPC prepares a Transportation Improvement Program (TIP) to assure conformance with the SIP. Conformity with the SIP means projects contained in the TIP will not worsen air quality or delay attainment of air quality standards. The Zoo Interchange reconstruction is included in SEWRPC's conforming TIP and, therefore, would not contribute to a substantial negative cumulative impact to air quality, as measured by current pollutant standards.

Consistent with DNR permitting requirements, WisDOT conducted a carbon monoxide screening analysis for the Zoo Interchange, which confirmed that reconstruction would not exceed air quality standards for carbon monoxide. In addition to meeting air quality standards, there is growing concern over the direct and cumulative effect of other hazardous air pollutants, typically referred to as Mobile Source Air Toxics (MSATs). WisDOT and FHWA evaluated the risk of increased MSATs of the Modernization Alternatives and the No-Build Alternative. Section 3.20 and Appendix C contain detailed discussions of MSAT analysis.

According to the MSAT analysis, MSATs will decrease in the future because of U.S. EPA's national pollution control programs (see Appendix C). In 2007, a new U.S. EPA rule to regulate MSATs, *Control of Hazardous Air Pollutants from Mobile Sources*, went into effect. The rule sets new standards for fuel consumption, vehicle exhaust emissions, and evaporative losses from portable containers that will be phased in between 2011 and 2015.

The MSAT analysis predicts that MSAT emissions will decrease 66 percent between 2004 and 2035 in the affected transportation network despite a projected 24 percent increase in vehicle miles traveled (VMT). Projected MSAT emissions in 2035 for the Modernization Alternatives would be slightly higher compared to the No-Build Alternative. MSAT emissions would be slightly higher under the 8-lane Modernization Alternatives than the 6-lane Modernization alternative because adding freeway capacity will attract more vehicles to the freeway, though emissions would still be below existing conditions.

When a highway is widened and, as a result, moves closer to receptors, the localized level of MSAT emissions may increase. However, this could be offset by increases in speeds and reductions in congestion, which are associated with lower MSAT emissions.

Greenhouse gas emissions are also a concern in the Zoo Interchange study area. While there are no accepted quantitative tools to estimate greenhouse gases at the project level, vehicles using the Zoo Interchange can be expected to contribute to greenhouse gas emissions within the region.

WisDOT recently released a report, *Transportation and Global Warming: Defining the Connection and the Solution* (CTC and Associates, 2007). The report noted that greenhouse gas emissions in Wisconsin grew by 26 percent in the last decade, compared to 20 percent across the U.S. The Governor's Task Force on Global Warming conducted another study in Wisconsin, which noted that the transportation sector accounts for approximately 24 percent of greenhouse gas emissions in Wisconsin, ranking second behind the energy sector at 35 percent (World Resources Institute, 2007). Transportation emissions have grown 19 percent from 1990 levels, with a concurrent 35 percent increase in VMT.

Currently, the major way to reduce emissions of greenhouse gases from transportation is to reduce the amount of fuel consumed, which can be accomplished by reducing congestion (more efficient driving conditions), reducing driving, and using more fuel efficient vehicles. WisDOT was a partner on the Governor's Task Force on Global Warming, providing input as part of the Transportation Work Group. Some of the policy recommendations from the Task Force's report include reducing emissions through improved vehicle technology, using low carbon fuels, and reducing VMT through land use planning and implementing public transit (DNR, 2008).

Managing and reducing greenhouse gases requires the continued use of appropriate land use and zoning policies that reduce travel demand within individual communities and southeast Wisconsin. A recent study published by the Urban Land Institute indicates that the continuing growth of VMT may offset emissions reduction gained through technological improvements in vehicles and fuels (Ewing, et al., 2007). The study points to the importance of reducing VMT by managing growth and land use patterns. Several studies on the relationship between land use and vehicle trips found that where diverse land use, accessible destinations, and interconnected streets exist, households drive 33 percent less compared to households in low-density developments.

WisDOT will continue to participate in statewide initiatives to reduce greenhouse gases, monitor the development of additional findings, and minimize impacts of projects to the greatest extent practicable.

Increased amounts of greenhouse gas in the atmosphere can have impacts on the environment and human health across on the planet. Examples of these impacts include rising sea levels, causing erosion of beaches and shorelines, destruction of aquatic plant and animal habitat, floods of coastal cities, and disruption of ocean current flows; a warming trend over much of the planet, broadening the range for many insect-borne diseases; and chronic stress of coral reefs. The possible impacts of global warming to Wisconsin include warmer and drier weather; decreases in the water levels of the Great Lakes, inland lakes, and streams (which may affect shipping operations); increases in water temperature (lowering water quality and favoring warm water aquatic species); changes in ecosystem and forest composition; increases in droughts and floods (impacting crop productivity); and reduction of snow and ice cover (lessening recreational opportunities) (Public Service Commission of Wisconsin and DNR, 2004).

3.2.3 Measures to Mitigate Adverse Effects

Several measures to mitigate potential adverse direct effects are noted in Section 3.2.2. No measures have been identified specifically to mitigate indirect or cumulative effects.

3.3 Transportation Service

3.3.1 Affected Environment

Mass Transit

Both intra-city and inter-city bus service and passenger rail service are available in the Zoo Interchange study area, providing transportation services to those traveling in and through the study area.

Intra-city Bus. The Milwaukee County Transit System (MCTS) is the largest local transit operator in Wisconsin. MCTS provides transit services for all of Milwaukee County and paratransit services (Transit Plus) for the elderly, persons with disabilities, and people with conditions that prevent them from using MCTS buses. Freeway Flyer express service is available along the I-94 and US 45 corridors. Freeway Flyer routes operate during weekday morning and evening rush hours, providing service between park-and-ride lots and downtown Milwaukee. Service is also provided to special events such as Summerfest, other lakefront festivals, and the Wisconsin State Fair.

In the study area, park-and-ride lots are located on the south side of I-94 at 76th Street and at Watertown Plank Road, west of US 45. Several MCTS Freeway Flyer routes operate on the study-area freeway system and several other MCTS routes operate on local streets in the study area **(Exhibit 3-2)**.

Three MCTS routes (Route 10 on Wisconsin Avenue/Bluemound Road, Route 31 on Watertown Plank Road, and Route 67 on 92nd Street) serve the Regional Medical Center. According to MCTS, the Regional Medical Center is one of their top ten ridership generators (MCTS, 2009). SEWRPC's draft *Milwaukee County Transit System Development Plan: 2009-2013* considers express bus service on Wisconsin Avenue and Bluemound Road that would serve the Regional Medical Center (SEWRPC, 2009). The regional transportation plan recommends east-west bus guideway/light rail transit service to the Regional Medical Center. Route 31 and, to a lesser extent, Route 23 (Highway 100) serve the Milwaukee County Research Park. No freeway-based bus service serves either facility, although the Route 45 Freeway Flyer services the Watertown Plank Road/US 45 park-and-ride lot.

Inter-City Bus. The Washington County Commuter Express provides several commuter bus routes that utilize the study-area freeway system. These routes include the following:

- Seven weekday round trips between West Bend and downtown Milwaukee via US 45 and I-94.
- Four morning weekday trips and five evening weekday trips between West Bend and the Research Park and the Regional Medical Center via US 45 and Watertown Plank Road. This route also travels along Wisconsin Avenue to Marquette University High School and the Veterans Affairs Medical Center.

In addition, Coach USA operates commuter bus routes that utilize the study-area freeway system. These routes include the following:

- Routes 901, 904, and 905 provide a total of 28 weekday trips from Waukesha County to downtown Milwaukee and 31 weekday trips from Milwaukee to Waukesha County via I-94. The hours of operation for these routes are between 5:00 A.M. and 10:30 P.M. Route 901 has a stop at the 76th Street park-and-ride lot.
- The Airport Express route provides 14 daily round trips via I-94 from Waukesha to downtown Milwaukee to General Mitchell International Airport, Chicago O'Hare International Airport, and Chicago Midway Airport.
- The University of Wisconsin-Whitewater route provides service between Whitewater and downtown Milwaukee via I-94, while school is in session (September through May). There are two trips from Whitewater to Milwaukee on Friday afternoons and two trips from Milwaukee to Whitewater on Sunday afternoon/evening. This route utilizes the 76th Street park-and-ride lot.
- The Megabus offers service to destinations throughout the Midwest. Two daily round trips between Minneapolis and Milwaukee utilize I-94.

Greyhound Bus Lines utilize the study-area freeway system and include the following routes:

- Two daily round trips between Green Bay and Milwaukee via US 45 and I-94.
- Six daily trips from Milwaukee to Minneapolis and four daily trips from Minneapolis to Milwaukee via I-94 with a stop at 84th Street.

Lamers Bus Lines provides a daily route with one round trip running between Milwaukee and Wausau with stops in the Fox Valley area. This route utilizes I-94 and US 45 within the study area.

The Badger Bus also operates six daily round trips between Madison and Milwaukee via I-94 with a stop at 84th Street.

Rail Service

Both passenger and freight rail service are provided in and near Zoo Interchange study area.

Passenger Rail Service. Amtrak provides one daily round trip between downtown Milwaukee and points west via the Empire Builder route. Amtrak operates this service on tracks owned by the Canadian Pacific Railway. The tracks cross under US 45 approximately 0.75 mile north of the Watertown Plank Road interchange.

Freight Rail Service. The Canadian Pacific Railway and Union Pacific Railroad service the study area. The Canadian Pacific Railway's main line, between western Canada and Chicago, crosses under US 45 approximately 0.75 mile north of the Watertown Plank Road interchange. The Union Pacific Railroad crosses over US 45 approximately 0.3 mile south of the US 45/ North Avenue interchange, over I-94 400 feet east of Highway 100, and under I-894/US 45 approximately 0.4 mile south of Greenfield Avenue. The same Union Pacific rail line also crosses over a former Canadian Pacific Railway line (to be converted to DNR's HAST), approximately 470 feet south of I-94 via a historic triple intersection Warren through truss bridge (See Section

3.25.1 or Section 4.3.7 for more information.) Approximately 30 trains per day travel along this segment of Union Pacific's rail line (Federal Railroad Administration, 2009).

Highways

I-94 is the major east-west roadway in the corridor. I-894/US 45 is the major north-south roadway in the corridor (see **Exhibit 1-1**). Other state and U.S. highways near the corridor that parallel I-94 are Greenfield Avenue (WIS 59) and Bluemound Road (US 18). Other state highways parallel to I-894 and US 45 include Highway 100 (108th Street/Mayfair Road) and 84th Street (WIS 181).

Bicycle/Pedestrian

The Oak Leaf Trail, planned HAST extension, planned Cross Town Connector, and on-street routes serve, or will serve, bicyclists and pedestrians. See Section 3.26, Recreational Resources for more information.

3.3.2 Transportation Impacts

Mass Transit

No effects are anticipated. Park-and-ride lots at Watertown Plank Road and 76th Street may be reconfigured but will still service transit riders.

All existing and proposed transit service to the Regional Medical Center and the Milwaukee County Research Park uses local streets (Wisconsin Avenue, Bluemound Road, 92nd Street, Watertown Plank Road, and Highway 100). The Modernization Alternatives would not directly affect any of the routes; all would continue to provide service to the Regional Medical Center and Milwaukee County Research Park. Local street traffic volumes would be lower under the 8-lane Modernization Alternatives than the 6-lane Modernization Alternatives, which may improve local bus service. Each street that carries local bus service may be closed during construction, which would require a detour (see Section 3.27, Construction). The regional transportation plan's recommended east-west bus guideway/light transit service to the Regional Medical Center would not use the study-area freeway system corridor; it could be implemented under any of the Modernization Alternatives.

Rail Service

Two Union Pacific Railroad bridges, one over I-94 near Highway 100 and one over US 45 near North Avenue, would be replaced under all the Modernization Alternatives. In addition, a Union Pacific Railroad bridge over North Avenue may be replaced. These bridges would be replaced with longer bridges to accommodate wider roadways. Bridges carrying US 45 over the Canadian Pacific Railway and I-894/US 45 over the Union Pacific Railroad would also be replaced.

Under all Modernization Alternatives, the Union Pacific rail line crossing over I-94 may remain in its existing alignment or be realigned approximately 30 feet to the east or west of its current location. If the tracks remain on their existing alignment, the historic triple intersection Warren through truss bridge over the former Canadian Pacific rail line would likely remain in service. However, if the railroad alignment is shifted to the east or west, the truss bridge would need to be removed from service and replaced with a new structure.

Highway Traffic and Operational Characteristics

Freeway. This section compares the No-Build Alternative with the Modernization Alternatives with respect to how the freeway will operate (i.e., how traffic flows). Level of service is a key descriptor to measure traffic flow, and is explained in Section 1 and illustrated in **Exhibit 1-13**. The following discussion focuses on traffic in the morning and afternoon rush hour in year 2035 since that represents the highest anticipated traffic volumes, assuming the freeways adjacent to the project area include eight traffic lanes. If the study-area freeway system is widened to eight lanes, there will be an indefinite period of time where the adjacent segments of the freeway system are six lanes. There will be peak hour congestion approaching the termini (southbound I-894/US 45 approaching Lincoln Avenue, eastbound I-94 approaching 70th Street, northbound US 45 approaching Burleigh Street, and westbound I-94 approaching 124th Street). This would occur regardless of where the termini are, and does not restrict consideration of alternatives on adjacent segments of the freeway system.

No-Build Alternative. Under the No-Build Alternative, the congestion described in Section 1 and illustrated in **Exhibits 1-14, 1-15, 1-17, and 1-18** would occur by 2035. Most segments of the study-area freeway system would operate at level of service F either in the morning or afternoon rush hour, or both.

Modernization Alternatives.

6-Lane Modernization Alternatives. The 6-lane Modernization Alternatives would improve traffic flow compared to the No-Build Alternative. Moving all exits and entrances to the right side of the freeway will eliminate some weaving, and providing longer entrance and exit ramps will improve traffic flow even though there would be no added through capacity. The study-area freeway system would generally operate at level of service D, E, and F during the morning and afternoon rush hour in 2035 (**Exhibits 3-3, 3-4, 3-5, and 3-6**). Areas that would experience level of service F include the following:

- I-894/US 45 northbound between Lincoln Avenue and Bluemound Road
- US 45 northbound and southbound near North Avenue and near Burleigh Street
- I-94 eastbound and westbound just west of Highway 100
- I-94 eastbound and westbound between 84th and 70th Streets

US 45 southbound would operate at level of service E between North Avenue and Wisconsin Avenue and between Greenfield Avenue and Lincoln Avenue.

8-Lane Modernization Alternatives. The 8-lane Modernization Alternatives would further improve traffic flow compared to the 6-lane Modernization Alternatives by adding an additional travel lane (**Exhibits 3-7, 3-8, 3-9, and 3-10**). As these figures illustrate, traffic flow would be similar under both 8-lane alternatives. Both 8-lane Modernization Alternatives would generally operate at level of service D or better (compared to D, E, and F for the 6-lane modernization, and E and F under the No-Build Alternative). No freeway segments would operate at level of service F. northbound I-894/US 45 between Greenfield Avenue and the core of the Zoo Interchange and other short segments of the freeway system would operate at level of service E during the morning or afternoon rush hour.

Local Roads. Traffic flow on local roads will depend on the alternative selected for the study-area freeway system. The No-Build Alternative and all 6-lane Modernization Alternatives would divert freeway traffic onto local streets during morning and afternoon rush hour because there would not be enough capacity on the study-area freeway system to handle the anticipated traffic volumes. The 8-lane Modernization Alternatives would not divert freeway traffic to local streets because of lack of capacity.

The access modification at Bluemound Road would divert I-94 eastbound and westbound traffic to local streets to reach Bluemound Road, and vice versa, under both the 6-lane and 8-lane Modernization Alternatives. Highway 100, Bluemound Road, and Wisconsin Avenue would carry more traffic as a result of the change in access to/from Bluemound Road and I-94. Even with this increase in traffic, volumes on Bluemound Road would be 4 percent lower under the 8-lane Modernization Alternatives than the No-Build and 6-lane Modernization Alternatives. Other arterials would also see a decline in traffic under the 8-lane Modernization Alternatives:

- Traffic volumes on Highway 100 would be 12 percent lower under the 8-lane Modernization Alternatives than the No-Build and 6-lane Modernization Alternatives.
- Traffic volumes on 84th Street would be 17 percent lower under the 8-lane Modernization Alternatives than the No-Build and 6-lane Modernization Alternatives.
- Traffic volumes on Watertown Plank Road would be 11 percent lower under the 8-lane Modernization Alternatives than the No-Build and 6-lane Modernization Alternatives.
- Only Greenfield Avenue would see an increase in traffic under the 8-lane Modernization Alternative compared to the No-Build Alternative (7 percent).
- 76th Street would see an increase in traffic under Alternative E1 compared to the E1/E3 Hybrid Alternative. In 2035, traffic volumes on 76th Street between I-94 and Greenfield Avenue would increase 14 percent (from 14,000 vpd to 16,000 vpd) under Alternative E1 compared to the No-Build and would decrease 14 percent (14,000 vpd to 12,000 vpd) under the E1/E3 Hybrid Alternative.

Freeway Access Changes. As noted, the access modification at Bluemound Road would divert I-94 eastbound and westbound traffic to local streets to reach Bluemound Road, and vice versa, under both the 6-land and 8-lane Modernization Alternatives. Drivers on I-94 that enter US 45 northbound from the Zoo Interchange would not be able to exit US 45 at Bluemound Road. Watertown Plank Road would be the first available exit for these drivers. The Regional Medical Center expressed concern over this arrangement because today Bluemound Road is one of two freeway access points to the center, along with Watertown Plank Road.

Safety

No-Build Alternative. Under the No-Build Alternative, none of the existing safety issues on the study-area freeway system would be addressed. The crash rate would likely remain the same, and congestion would continue to increase. As a result, more traffic would divert to local streets. In general, travel on local streets takes longer than travel on freeways and crash rates are also higher on local streets than freeways (based on WisDOT crash data). Higher traffic volumes on local streets also increase the potential for car-pedestrian and car-bicycle crashes.

Modernization Alternatives. The Modernization Alternatives would likely reduce crash rates by eliminating all substandard design features.

The 8-lane Modernization Alternatives may further reduce crashes by reducing the level of congestion compared to the 6-lane Modernization Alternatives. Research suggests that the crash rate on a roadway may vary based on the level of congestion, and that increased congestion leads to increased crash rates (Lord et al., 2003; Zhou and Sisiopiku, 1997). The reduction in crash rate corresponds to the level of service, with a 10 percent reduction in crash rate for each letter grade improvement in level of service.

Traffic volumes on local streets adjacent to the study-area freeway system would generally be lower under the 8-lane Modernization Alternatives compared to the No-Build Alternative and the 6-lane Modernization Alternatives. In general, crash rates on local streets are higher than crash rates on freeways.

Access to Facilities and Services

No-Build Alternative. Under the No-Build Alternative, no changes to facilities or services would occur. Increased congestion may affect access to some facilities and services by increasing travel times.

Modernization Alternatives. The Modernization Alternatives would maintain access to facilities and services though in some areas the access would be modified. The level of congestion would vary between the 6-lane and 8-lane Modernization Alternatives, which may affect access to some facilities and services by increasing travel times. Travel times would generally be higher under the 6-lane Modernization Alternatives than the 8-lane Modernization Alternatives. There would be no major changes in access along the west leg.

North Leg. All the Modernization Alternatives would eliminate direct freeway access to/from I-94 and Bluemound Road (via US 45). Vehicles on US 45 southbound and vehicles on I-894/US 45 northbound would be able to access Bluemound Road.

East Leg. All the Modernization Alternatives would maintain an interchange at 84th Street and 70th Street. Modernization Alternative E1 would modify access to 84th Street such that drivers exiting eastbound I-94 at 84th Street and drivers entering I-94 westbound from 84th Street would travel 1 mile out of their way **(Exhibit 3-11)**. The E1/E3 Hybrid Alternative would provide conventional diamond interchange ramps at the 84th Street interchange for the I-94 eastbound entrance and exit and I-94 westbound exit movements. The westbound I-94 entrance movement would follow the pattern of Modernization Alternative E1, meaning drivers entering I-94 westbound from 84th Street would travel 1 mile out of route. The City of West Allis, State Fair Park Board, and some residents are concerned about the indirect effect Modernization Alternative E1 would have since it is not intuitive for drivers and would likely increase travel time.

South Leg. A sub-alternative under all the Modernization Alternatives is to provide a ramp for drivers on eastbound I-94 to exit at Greenfield Avenue via I-894/US 45. This ramp would retain the current access to Greenfield Avenue from I-94 eastbound. If the ramp is not provided, drivers on I-94 could reach Greenfield Avenue via Highway 100 or 84th Street.

EXHIBIT 3-11
E1 Texas U-Turns at 84th Street

West Leg. All the Modernization Alternatives would maintain an interchange at Highway 100. Modernization Alternative W3 would remove the existing westbound I-94 exit to northbound Highway 100, and the exit ramp to Highway 100 north and south would be via a loop ramp in the northwest quadrant of the interchange. The entrance ramps from Highway 100 to I-94 would be consolidated into one ramp that would split into two ramps, one eastbound and one westbound.

3.3.3 Measures to Mitigate Adverse Transportation Impacts

Section 3.27.4, Construction Impacts, describes measures to manage congestion during construction which would be a result of lane closures on the study-area freeway system and adjacent local streets.

WisDOT and FHWA are coordinating railroad bridge construction with Union Pacific Railroad to minimize interruptions to rail service while replacing the railroad bridges over I-94, US 45, and potentially North Avenue and I-894/US 45 over the Union Pacific Railroad. WisDOT and FHWA will coordinate with Canadian Pacific Railway to minimize interruptions to rail service while replacing the US 45 bridge over the Canadian Pacific rail line.

3.4 Utilities

3.4.1 Affected Environment

Underground and overhead utilities are located throughout the project corridor. The utilities noted in this section are "major" utilities, including electrical and gas transmission lines, and large water lines (over 16-inch) and sewers (over 36-inch).

Electrical

Major underground and overhead electrical transmission lines cross the project corridor in two locations **(Exhibit 3-12)**:

- Along the east side of I-894/US 45, between Lincoln Avenue and the electrical substation (96th Street substation), in the northeast quadrant of the Zoo Interchange are four overhead 138-kilovolt (kv) electrical transmission lines. North of Greenfield Avenue, the transmission lines are about 60 feet from the edge of the freeway. We Energies owns a 100- to 120-foot-wide corridor between I-894/US 45 and houses on 98th Street for the transmission lines (American Transmission Company owns the transmission lines). We Energies has four electrical distribution lines in this corridor.

EXHIBIT 3-12
Major Electrical Transmission Crossings

- Six overhead and two underground 138-kv electrical transmission lines parallel I-94. East of the Zoo Interchange, the transmission lines are about 0.25 mile north of the freeway. West of the Zoo Interchange the transmission lines are next to the Milwaukee County Zoo and then cross over and under I-94 to the south side of the freeway. An electrical substation (Bluemound Road substation) is located on the south side of I-94, west of Highway 100. We Energies has 10 electrical distribution lines in this corridor.
- One of the Regional Medical Center's main power sources is an underground line from the 96th Street substation on the east side of US 45.

Gas

Gas mains cross all four legs of the project corridor. Six high-pressure natural gas mains cross I-94 (at Highway 100 and 76th Street); US 45 (at Wisconsin Avenue, Highway 100, and Watertown Plank Road); and I-894 (at Greenfield Avenue).

Water

The cities of Milwaukee, Wauwatosa, and West Allis provide water service. All of the drinking water in the study area comes from the Milwaukee Water Works. Water mains cross I-94, I-894, and US 45 in the project corridor.

Steam and Chilled Water

Two 12-inch chiller lines and two 6-inch steam lines, used to cool and heat Milwaukee County-owned buildings, cross under US 45 near Watertown Plank Road. We Energies owns these steam and chilled water lines.

Sewer

The cities of Milwaukee, Wauwatosa, and West Allis and MMSD provide sanitary sewer service in the study area. Several metropolitan interceptor sewers cross I-94, I-894, and US 45. Milwaukee, Wauwatosa, and West Allis maintain sanitary sewers that feed into MMSD's collector sewers.

WisDOT Utilities

WisDOT has communication lines and storm sewers in the freeway right-of-way.

Fiber Optics

WisDOT and three telecommunications companies have underground fiber optic lines in the study area.

3.4.2 Utility Impacts

No-Build Alternative

Under the No-Build Alternative, no utility impacts would occur.

Modernization Alternatives

The Modernization Alternatives would require relocation or replacement of overhead and buried utilities that would conflict with roadway improvements. The utility impacts of the Modernization Alternatives are similar.

The key utility impact of the Modernization Alternatives would be relocating several underground and overhead electrical transmission lines on the south and west legs. On the south leg, the four overhead transmission lines next to I-894/US 45, between Greenfield Avenue and the Zoo Interchange, would be rebuilt in a narrower corridor that would remain next to the freeway's wider footprint after reconstruction. No new right-of-way would need to be acquired from adjacent property owners to accommodate the transmission lines.

On the west leg, the six electrical transmission lines (on three parallel sets of towers) would stay in their current location west of the Highway 100 interchange. East of Highway 100, WisDOT and American Transmission Company are evaluating different locations for the towers. Two to four of the overhead transmission lines on one or two sets of towers could remain on the north side of the freeway, in a narrower utility corridor between I-94 and the Milwaukee County Zoo. This would require a 3- to 4-acre utility easement from the south side of the Milwaukee County Zoo. Some of the vegetative buffer between I-94 and the zoo would have to be removed from the easement. The Milwaukee County Zoo expressed concern over having any overhead electrical transmission lines in what is now the vegetative buffer area between I-94 and the zoo because of the loss of the buffer and visual impact of the towers and wires. WisDOT and ATC continue to explore alternatives that would avoid easements and visual impacts to the zoo. WisDOT and ATC are working on an option that has no overhead transmission lines adjacent to the zoo. See Section 3.26, Recreational Resources/Public Use Lands, for more information.

The remaining two to four transmission lines could be routed in or adjacent to the HAST right-of-way, between Highway 100 and I-894/US 45. The towers would not interfere with DNR's planned 14-foot-wide multi-use trail or restoring rail service in this 80- to 100-foot-wide corridor. East of I-894/US 45, the transmission lines would cross over I-94 to the 96th Street substation, in the northeast quadrant of the interchange.

In total, up to 61 electrical transmission towers would need to be relocated.

Other utility impacts include:

- Relocating the steam and chiller lines near Watertown Plank Road at US 45
- Relocating numerous electrical distribution lines
- Relocating numerous water mains and sewer lines
- Relocating numerous fiber optic lines (Sprint, AT&T, Rogers, and WisDOT)
- Relocating cell towers

3.4.3 Measures to Mitigate Adverse Utility Impacts

WisDOT will compensate American Transmission Company and We Energies for relocating their electrical transmission lines, if required. American Transmission Company will compensate DNR and the Milwaukee County Zoo for building electrical transmission towers on DNR's HAST corridor and the zoo, if required.

WisDOT and FHWA will continue coordinating with utilities, municipalities, and the county to avoid or minimize interruptions in service during construction.

3.5 Residential Development

3.5.1 Affected Environment

Though many residences are near the study-area freeway system, relatively few share a property line with the freeway. In most areas, utility corridors, local streets, and noise walls provide a buffer between residences and the freeway.

North Leg

Several pockets of residences are located along the north leg of the Zoo Interchange. In the northeast quadrant of the Zoo Interchange, the Parkside Pool Apartments complex shares a property line with US 45. This apartment complex consists of 106 units and offers one- and two-bedroom apartments at rents between $610 and $710 per month. West of US 45, 15 single-family residences are located along 97th Street, between Bluemound Road and Wisconsin Avenue. On the east side of US 45, between Bluemound Road and Wisconsin Avenue, there are eight single-family residences and one multi-family residence.

Further north along US 45, there are residences in three quadrants of the North Avenue interchange. In the southwest quadrant, Highlands of Mayfair, a 36-unit condominium complex, shares a property line with US 45. Eleven residences and one multi-family residence on 113th Street, 114th Street, and Garfield Avenue are 50 to 275 feet from the North Avenue on-ramp to southbound US 45.

Between North Avenue and Center Street, there are 39 single-family residences on 113th Street west of US 45, and 22 single-family residences and 10 multi-unit residences on 112th Street east of US 45. These residences are about 130 to 160 feet from US 45. There are no noise walls, and US 45 is depressed through this area. There are no residences adjacent to the study corridor between Center Street and Burleigh Street.

East Leg

On the east leg, south of I-94, there are 49 residences on Adler Street, between 95th Street and 84th Street. These residences are a combination of single-family residences, duplexes, and multi-family residences. Based on a field review, approximately 28 of the 49 residences are single-family residences, and the rest are duplexes or multi-family residences. Most of the residences along Adler Street were constructed in the 1950s and early 1960s. These residences are 130 to 150 feet from I-94, and there is no noise wall.

Between 76th Street and the eastern project limit at 70th Street, 10 single-family residences are on Kearney Street south of I-94. These residences were generally constructed during the late 1910s and 1920s. These residences are approximately 130 feet from I-94, and there is no noise wall.

On the east leg, north of I-94, Chester Street parallels I-94 from approximately 94th Street to 89th Street. On the north side of Chester Street, there are seven single-family residences west of 92nd Street, and three multi-unit residential structures east of 92nd Street. The seven single-family residences were constructed in the 1950s, and the multi-family structures were constructed during the 1960s. These residences are approximately 115 to 150 feet north of I-94, and there is no noise wall.

O'Connor Street parallels I-94 to the north between 84th Street and the east project limit at 70th Street. There are 19 single-family residences and seven multi-family residences on the north side of O'Connor Street in this area. Most houses in this area were built in the 1940s and 1950s with a handful constructed in the 1910s and 1920s. There is a noise wall between I-94 and homes on O'Connor Street, between 76th Street and 84th Street. These residences are located approximately 70 to 190 feet from I-94.

South Leg

Between the Zoo Interchange and Greenfield Avenue, there are 29 single-family residences located on 100th Street, west of I-894/US 45. These homes are 160 to 170 feet from the freeway, and there is a noise wall.

On the east side of I-894/US 45, between the Zoo Interchange and Greenfield Avenue, there are 43 single-family residences located on the west side of 98th Street. These residences are 225 to 300 feet from I-894/US 45. Of these 43 residences, 33 share a property line with the We Energies utility corridor, while the remaining 10 residences share a property line with the northbound Greenfield Avenue on-ramp. There is no noise wall on the east side of the freeway.

There are 22 single-family residences along the west side of 100th Street, between Greenfield Avenue and the Union Pacific Railroad, about 100 to 150 feet west of I-894/US 45. There are no noise walls adjacent to I-894/US 45 south of Greenfield Avenue.

South of Greenfield Avenue and east of I-894/US 45, the 66-unit Parkway Central Apartments is roughly 450 to 500 feet from the northbound Greenfield Avenue off-ramp.

South of the Union Pacific Railroad on 102nd Street, the three-building, 330-unit Lincoln Crest apartments shares a property line with I-894/US 45. Between the Lincoln Crest Apartments and Lincoln Avenue, 11 multi-family residences share a property line with I-894/US 45. On the east side of I-894/US 45, between Becher Street and Lincoln Avenue, 17 single-family residences on 99th Street are 325 to 400 feet from I-894/US 45.

West Leg

On the west leg, there are no residences adjacent to I-94. Residences on Bungalow Parkway are about 450 to 500 feet south of I-94, between I-894/US 45 and Highway 100. The zoo maintenance facility and the planned HAST lie between I-94 and this neighborhood.

West of Highway 100, Chippewa Park buffers residences on Park Hill Avenue from I-94. These residences are 350 to 400 feet from I-94. Further west, a neighborhood with more than 30 residences is located north of I-94, between 121st Street and Underwood Creek. At its closest point, the houses in this neighborhood are approximately 270 feet from I-94, and separated from I-94 by Fairview Avenue and a light industrial area. There are no noise walls on the west leg.

3.5.2 Residential Impacts

Relocations

No-Build Alternative. No residential displacements would occur under the No-Build Alternative.

Modernization Alternatives. The Modernization Alternatives would have similar residential relocation impacts in the core (5 residential relocations), north leg (1 residential relocation),

south leg (0 to 6 residential relocations), and west leg (none). On the east leg, there is a difference between Alternative E1 and E1/E3 Hybrid Alternative. The actual number of relocations will vary depending upon the sub-alternatives chosen.

In the southwest corner of the Zoo Interchange, all the Modernization Alternatives would require relocation of five single-family residences on 100th Street north of Schlinger Avenue (**Exhibit 3-13**).

On the south leg, the sub-alternative of adding a ramp from eastbound I-94 to Greenfield Avenue would require six residential relocations (four single-family and one duplex) on 100th Street.

On the east leg, the 8-lane E1/E3 Hybrid Alternative would require 20 residential relocations, consisting of 14 single-family residences and duplexes on or adjacent to Adler Street, (**Exhibit 3-14**). The 6-lane E1/E3 Hybrid Alternative would require 19 residential relocations, consisting of 13 single-family residences and duplexes on and adjacent to Adler Street. Modernization Alternative E1 would not require any residential relocations.

After a preferred alternative is identified and refined, the actual number of residential displacements for any of the Modernization Alternatives could change during the design phase.

The impacts of reconstructing and expanding the study-area freeway system also affects the physical and social setting, community services, and other factors that promote a sense of community among residents in the study area.

TABLE 3-4
Residential Relocations by Leg and Alternative

Legs	6-lane Alternatives	8-lane Alternatives
Core	5	5
North Leg	1 (N1 and N3)	1 (N1 and N3)
East Leg	0 (E1) to 19 (E1/E3 Hybrid)	0 (E1) to 20 (E1/E3 Hybrid)
South Leg	0 (6 with ramp to Greenfield Avenue) (S2)	0 (6 with ramp to Greenfield Avenue) (S2)
West Leg	0 (W3)	0
Total	**6 to 31**	**6 to 32**

Note: The number of relocations is based on housing units, not individual buildings. A duplex is counted as two residential relocations.

Neighborhood Splitting

The proposed improvements would not split or divide any neighborhoods. The study-area freeway system would remain in its existing corridor, and largely within the existing right-of-way. All existing crossroads over or under the study-area freeways would be maintained.

Isolation of Distinct Groups, Real or Perceived

Since the proposed action would not create a new corridor, no isolation of distinct groups is anticipated beyond the existing condition.

New Development Assisted or Discouraged by the Project

See Section 3.2.1, Indirect Effects.

Changes in Property Values

Please see Section 3.9.2 for more information.

3.5.3 Measures to Mitigate Adverse Residential Impacts

Federal property acquisition law provides for payment of just compensation for residences displaced for a federally-funded transportation project (Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended [Uniform Act]). Acquisition price, replacement dwelling costs, moving expenses, increased rental or mortgage payments, closing costs, and other relocation costs are covered for residential displacements.

Under state law, no person or business would be displaced unless a comparable replacement dwelling, business location, or other compensation (when a suitable replacement business location is not available) would be provided. Compensation is available to all displaced persons without discrimination. Prior to appraisals and property acquisition, an authorized relocation agent interviews each owner and renter to be relocated to determine their needs, desires, and unique situations associated with relocating. The agent explains the relocation benefits and services each owner may be eligible to receive.

Property acquisitions not involving residential, business, or other building relocations are also compensated in accordance with state and federal laws. Before initiation of property acquisition, WisDOT provides information explaining the acquisition process and the state's Eminent Domain Law under Section 32.05, Wisconsin Statutes. A professional appraiser inspects the property to be acquired. Property owners are invited to accompany the appraiser to ensure that full information about the property is taken into consideration. Property owners may also obtain an independent appraisal. Based on the appraisal, the value of the property is determined and that amount offered to the owner. In the event agreement on fair market value cannot be reached, the owner would be advised of the appropriate appeal procedure.

A search of available housing from local realtor listings in October 2008 reported more than 150 homes with similar price ($125,000 to $230,000) located within 0.5 mile of the study area. A search of replacement rental housing was also conducted, and revealed 32 rental properties similar to the units that would be needed. One-, two-, and three-bedroom units are within one mile of the study area, starting at $535 per month. Replacement rental housing available includes duplexes and apartment buildings.

Any septic tanks, drain fields, or wells on acquired properties would be abandoned in accordance with state regulations and local zoning standards. WisDOT will survey all buildings to be demolished to determine whether asbestos or lead paint is present. All appropriate and applicable engineering and regulatory controls will be followed during the handling and disposal of asbestos-containing material and lead-based paint. Contractors must comply with U.S. EPA regulations; National Emission Standards for Asbestos; the Occupational, Safety, and Health Administration regulations on asbestos removal; local government regulations; and all other applicable regulations. The most recent editions of all applicable standards, codes, or regulations shall be in effect. In addition, any person

performing asbestos abatement must comply with all training certification requirements, rules, regulations, and laws of the State of Wisconsin regarding asbestos removal.

Before a contractor demolishes a building that may contain or is known to contain asbestos, the contractor must notify DNR and Wisconsin Department of Health and Family Services at least 10 working days before starting the work, using DNR Form 4500-113: "Notification of Demolition and/or Renovation and Application for Permit Exemption."

Demographic data for the areas in which residential displacements would occur do not indicate age or income level characteristics that would require special relocation consideration or services. If unusual circumstances were to arise during real estate activities, WisDOT real estate personnel would be available to provide appropriate relocation services.

3.6 Commercial and Industrial Development

3.6.1 Affected Environment

Commercial and industrial development occurs throughout the study area, with the highest concentration found along the north leg and heavy concentrations in areas adjacent to the freeway system as well. Some of the larger commercial and industrial entities include GE Healthcare, Quad Graphics, and Mayfair Mall.

North Leg

On the north leg, commercial development can be found at nearly every service interchange. The largest concentration of commercial development is located between Wisconsin Avenue and Watertown Plank Road, both east and west of US 45. On the west side, the 175-acre Milwaukee County Research Park is home to more than 70 businesses, employing more than 2,000 people. The park contains nearly 1.7 million square feet of gross leasable space and notable occupants include GE Healthcare and Alterra Health Care Corporation (Milwaukee County Research Park Corporation, 2008; Wauwatosa Economic Development Commission, 2008; The Business Journal, 2008).

Mayfair Mall, the largest retail development in the study area, is located along Highway 100, just east of US 45 and north of North Avenue in Wauwatosa. Mayfair Mall is a regional shopping center with more than 180 stores. In addition to Mayfair Mall, commercial development is located along both sides of Highway 100 from Bluemound Road on the south to Burleigh Avenue on the north. Various businesses are located within this area of Highway 100, including restaurants, gas stations, real estate and financial services, and various retail stores.

There are a number of businesses at the Burleigh Avenue and US 45 interchange. On the south side of Burleigh Avenue, Alro Steel, Hansen Storage, and Stroh Die Casting are in an area that is currently being considered for redevelopment. In the northwest quadrant of Burleigh Avenue and US 45, JCP Logistics is the regional distribution center for JC Penney's retail stores in the upper Midwest.

In addition to the businesses currently located at Burleigh Avenue and US 45, land is being considered for redevelopment east of US 45. One parcel, known as the Burleigh Triangle, was formerly home to the Roundy's and Kohl's food distribution warehouses. This parcel is being considered for a mixed-use development and would include a townhouse or multi-story

condominium development, corporate offices, and retail establishments. The other parcel, known as the Burleigh Rectangle, is a 5.8-acre site formerly occupied by two automobile dealerships. A mixed-use redevelopment is also being considered for this site. Development plans include a medical office building, retail center, parking garage, hotel, and a condominium tower (Wauwatosa Economic Development Commission). More information about the Burleigh Rectangle and Triangle redevelopment projects can be found at www.wedc.net.

East Leg

Land adjacent to I-94 is primarily residential, with the exception of the Honey Creek Corporate Center, which is located north of I-94 and west of 84th Street, and two businesses along Adler Street, south of I-94. The Honey Creek Corporate Center is a 416,672-square-foot, four-building office complex located on approximately 26 acres adjacent to I-94.

South Leg

Land adjacent to I-894 is predominantly residential with some commercial development located at the Greenfield Avenue and Lincoln Avenue interchanges. In the southwest quadrant of Greenfield Avenue and I-894, there is a seven-building business park that extends from Greenfield Avenue on the north to the Union Pacific Railroad on the south. Businesses in this area include financial institutions, supply companies, a healthcare company, and some small manufacturing companies.

West Leg

At the I-94 and Highway 100 interchange, Wheaton-Franciscan Healthcare Center and a motel are located north of I-94 and west of Highway 100. Colder's Furniture and Quad Graphics occupy the southwest quadrant of the interchange. Further west along I-94, the I-94 and Highway 100 Industrial Park occupies land between 116th Street on the east, Underwood Creek Parkway on the west, I-94 on the north, and West Theodore Trecker Way on the south. A number of plastics, molding, and die cast businesses are also located in this park. This area continues on the north side of I-94, between 116th Street on the east, 121st Street on the west, West Dearborn on the north, and I-94 on the south.

3.6.2 Commercial and Industrial Impacts

Although the study-area freeway system is access-controlled (meaning no business entrances are connected directly to the freeway), service-oriented businesses located near interchanges rely on freeway travelers for their continued viability.

Businesses' employees, patrons, shippers, and suppliers depend on the study-area freeways system to varying degrees for their continued viability. Businesses throughout southeastern Wisconsin use the study-area freeway system to access other parts of the region, state, and country.

No-Build Alternative

No businesses would be relocated under the No-Build Alternative.

Modernization Alternatives

The Modernization Alternatives would have the same business relocation impacts in the core (one business relocated), north leg (one business relocated), south leg (two to three businesses), and west leg (one business). On the east leg, there is a difference between Alternative E1 (no businesses relocated) and the E1/E3 Hybrid Alternative (one business relocated) (**Exhibit 3-15**).

In the southwest corner of the Zoo Interchange, a security systems store on 100th Street would be relocated under all the Modernization Alternatives.

On the north leg, an automotive oil and lubrication shop would be relocated under all the Modernization Alternatives.

On the east leg, Alternative E1 would not relocate any businesses. The E1/E3 Hybrid Alternative would relocate a musical instrument store (band instrument sales, service, lessons, and music) on Adler Street, south of I-94.

On the south leg, a Christian book store and an adult variety and video store on the east side of I-894/US 45 at Greenfield Avenue would be relocated under all Modernization Alternatives. If the I-94 eastbound to Greenfield Avenue ramp sub-alternative is built, a photography studio on 100th Street, south of Schlinger Avenue, would be relocated.

On the west leg, a hotel on the north side of I-94 at Highway 100 would be relocated under all Modernization Alternatives.

TABLE 3-5
Commercial Relocations by Alternative

Legs	6-lane Alternative	8-lane Alternatives
Core	1	1
North Leg	1 (N1 and N3)	1 (N1 and N3)
East Leg	0 (E1) to 1 (E1/E3 Hybrid)	0 (E1) to 1 (E1/E3 Hybrid)
South Leg	2 (3 with ramp to Greenfield Avenue)	2 (3 with ramp to Greenfield Avenue)
West Leg	1	1
Total	**5 to 7**	**5 to 7**

3.6.3 Transportation User Benefits

No-Build Alternative

Continued and frequent maintenance of the deteriorated pavement would cause further lane closures and increased congestion, but safety deficiencies would not be improved. Allowing the study-area freeway system to deteriorate further could lead to weight restrictions on bridges and potential closures of some portions of the study-area freeway system.

Modernization Alternatives

The Modernization Alternatives would reduce crashes on the study-area freeway system compared to the No-Build Alternative. The 6-lane Modernization Alternatives would offer some congestion reduction compared to the No-Build Alternative. The 8-lane Modernization Alternatives would reduce congestion to a greater extent than the 6-lane Modernization Alternatives. Reduced congestion on the freeway system can translate into increased savings for area businesses in both the travel time and capacity of the freeway for the movement of goods and services within and through the region. Improved travel times would allow for greater capacity for movement of goods and services on the freeway system.

Access During Construction

Access to businesses will be maintained during construction, though commuters, business patrons, shippers, and suppliers will experience inconvenience and additional travel time (see Section 3.27.7, Traffic/Conceptual Construction Staging).

3.6.4 Measures to Mitigate Adverse Commercial and Industrial Impacts

Commercial and industrial acquisitions and relocations would be in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. In addition to providing just compensation for property acquired, additional benefits are available to eligible displaced businesses, including relocation advisory services, reimbursement of moving expenses, and down-payment assistance. Under state law, no person would be displaced unless a comparable business location or other compensation (when a suitable business location replacement is not practical) is provided. Compensation is available to all displaced businesses without discrimination.

Before initiating property acquisition activities, property owners would be contacted and given a detailed explanation of the acquisition process and Wisconsin's Eminent Domain Law under Section 32.05, Wisconsin Statutes. Any property acquired would be inspected by one or more professional appraisers. The property owner would be invited to accompany the appraiser during the inspection to ensure that the appraiser is informed of every aspect of the property. Property owners will be given the opportunity to obtain an appraisal by a qualified appraiser that will be considered by WisDOT in establishing just compensation. Based on the appraisal, the value of the property would be determined and that amount offered to the owner.

Before a contractor demolishes a building that may contain or is known to contain asbestos, the contractor must notify DNR and Wisconsin Department of Health and Family Services at least 10 working days before starting the work, using DNR Form 4500-113: "Notification of Demolition and/or Renovation and Application for Permit Exemption."

There are no known age, ethnic, handicapped, or minority characteristics that would require special relocation consideration for any business displacement. No unusual requirements are anticipated that would preclude successful relocation, except the adult variety bookstore. This bookstore requires an adult entertainment license to operate. All municipalities require this type of zoning, but the zoning location must be investigated within each individual community. The adult entertainment license is applied for by the owner/tenant at the time of application. The application process may add several months to a year to the relocation process for this particular business. There is currently one such business for sale in Manitowoc that includes the license for adult entertainment.

The Multiple Listing Service for April 2009 listed more than 16 warehouse/office space locations in the Milwaukee and Waukesha area that would be adequate for business relocations needed on 100th Street. There is one oil change retail store and several auto service centers available for sale in Milwaukee County that could be retrofitted for the oil change business on Highway 100. There is at least one motel for sale in Milwaukee County and several others in Racine, Dane, and Walworth counties that approach the size of the Super 8 Hotel on Highway 100 that would be relocated. There are also stand-alone buildings available that could serve the music store, bookstore, and photography studio. There are more than 100 available retail establishments, based on the Multiple Listing Service, in Milwaukee County.

Based on Multiple Listing Service, there are enough available properties to provide appropriate relocations for the displaced businesses. However, the state of the economy in April 2009 exhibits a greater than normal number of business and commercial listings. As these businesses are relocated in the future, the number of business and commercial listings may change, but it appears likely that sufficient replacement business buildings will be available when required.

3.7 Agricultural Resources

There are no agricultural resources in the study area.

3.8 Institutional and Public Services

3.8.1 Affected Environment

Fire, Ambulance, and Police Protection

The City of Milwaukee is served by the Milwaukee Fire Department, which consists of full-time paramedics and firefighters providing services from 36 fire stations. The Milwaukee Fire Department has a fire station on 84th Street, just north of I-94, housing Engine Company 25 and Hazardous Material Teams 1 and 2. This station utilizes the 84th Street interchange to access incidents located along or adjacent to the study-area freeway system. This station is responsible for responding to calls in the core of the Zoo Interchange and the east leg. For calls within the community, emergency service vehicles use 84th Street as a north-south route and Bluemound Road or Wisconsin Avenue as east-west routes.

The City of Wauwatosa is served by the Wauwatosa Fire Department, which consists of full-time paramedics and firefighters providing services from three fire stations. One of the fire stations is located on Watertown Plank Road, 0.35 mile west of US 45. This station utilizes the Watertown Plank Road interchange to access incidents located along the study-area freeway system. For calls within the community, emergency service vehicles use Highway 100 as a north-south route and Wisconsin Avenue as an east-west route.

The City of West Allis is served by the West Allis Fire Department, which consists of full-time paramedics and firefighters providing services from three fire stations. The West Allis Fire Department has a fire station on Highway 100, just south of Greenfield Avenue, housing Engine 1, Medical Unit 1, and Fire Rescue 1. To access incidents located on the freeway, this station utilizes the Highway 100 interchange and the Greenfield Avenue interchange. If the ramps are congested, they drive west to Moorland Road to access the freeway or send services

from a station located near National Avenue and 73rd Street, which increases response time. Emergency service vehicles use Greenfield Avenue to access incidents within the community.

A private ambulance service provider is located on 92nd Street in the southeast quadrant of the Zoo Interchange.

The Milwaukee County Sheriff's Office has a patrol substation on Watertown Plank Road, adjacent to Milwaukee County's DPW facility.

Schools

The Milwaukee, Wauwatosa, and West Allis public school districts serve the study area. There are a number of schools, public and private, located within 0.25 mile of the study-area freeway system (**Exhibit 3-16**).

Milwaukee Montessori School, a private K-8 school, is located on the east side of US 45, south of Bluemound Road.

There are five public schools in the Wauwatosa school district adjacent to US 45, including the Plank Road School and River Hills School located on Watertown Plank Road and three schools (Whitman Middle School, Eisenhower Elementary, and Wauwatosa West High School) on Center Street. Wauwatosa West, located west of US 45, has athletic fields east of US 45, accessible by way of a pedestrian bridge over the freeway. Wauwatosa West, Whitman, and Eisenhower are traditional schools, where as the Plank Road School provides educational services to children who are placed by the Milwaukee County courts in a nearby residential treatment facility (see St. Charles Youth and Family Services, below). The River Hills School provides educational services for children who are part of Milwaukee County Children and Adolescent Services Programs.

In West Allis, there is one public school (Irving Elementary) and two private schools (Good Shepherd's Lutheran School and Lamb of God Lutheran School) in the study area. Lamb of God Lutheran is located on the east side of I-894/US 45, on the north side of Lincoln Avenue. Good Shepherd's Lutheran School is located on 100th Street, on the west side of I-894/US 45. There is no noise wall between the school and the freeway.

The school districts in the area either use or cross the study-area freeway system to transport students to school. Students also use the MCTS for their daily commute to school.

Places of Worship

There are 11 churches within 0.25 mile of the study-area freeway system (**Exhibit 3-16**). The churches located closest to the study-area freeway system include St. Mark's Lutheran Church, Church in Milwaukee, St. Therese Catholic Church, Faith United Methodist Church, Good Shepherd's Evangelical Lutheran Church, Greenfield Avenue Presbyterian Church, and Woodlawn Lutheran Church. St. Therese's property abuts US 45 on the west side of the church. Woodlawn Lutheran Church abuts I-894/US 45 at Lincoln Avenue.

Three other churches are across the street from I-94 or US 45: St. Mark's on 95th Street, adjacent to the northbound off-ramp to Bluemound Road; Faith United Methodist Church, on Adler Street; and Good Shepherd's Evangelical Lutheran Church on 100th Street. Greenfield Presbyterian Church is located on 97th Street, less than 300 feet from the Greenfield Avenue exit ramp.

St. Charles Youth and Family Services

St. Charles Youth and Family Services, Inc. is a non-profit human services agency that provides an array of prevention and intervention services. The agency has a 7.5-acre campus located in the northwest quadrant of the I-94/84th Street interchange. The agency employs more than 250 persons. Services provided at the agency range from mentoring and day treatment to sheltered care with stays up to 60 days.

St. Charles also runs the youth Focus Program, under contract from Milwaukee County Department of Delinquency and Court Services, in the Milwaukee County Child and Adolescent Treatment Center (Buildings E and F), adjacent to US 45. Youth live in Buildings E and F, which are "staff secure Type 2 residential treatment facilities." About 90 percent of the youths in the Focus Program are minority (Milwaukee County Department of Delinquency and Court Services, 2009).

Boy Scouts of America

The Walter and Olive Stiemke Scout Service Center is located in the northeast quadrant of I-94 and 84th Street and is home to the Milwaukee County Council of the Boy Scouts of America and the Milwaukee Scout Shop, which sells uniforms, apparel, literature, and camping equipment to area scouts. The Milwaukee County Council registers new members, offers leadership training programs, and provides resources such as books, videotapes, and information fliers for local troops.

Milwaukee County Buildings and Facilities

Several Milwaukee County-owned buildings and facilities are located adjacent to US 45 (**Exhibit 3-17**):

- **Milwaukee County DPW**. Milwaukee County DPW maintains a maintenance and storage facility on Watertown Plank Road, west of US 45. The 30-acre facility consists of a material storage yard, fleet storage buildings, administration buildings, a salt dome, and storage space. The east side of the facility, adjacent to US 45, is a surface parking and outdoor vehicle storage area. The surface parking area is heavily used as a park-and-ride lot during summer festivals, including Summerfest and State Fair Park.
- **Sheriff**. The Sheriff's Department patrol substation is located adjacent to the DPW's facility.
- **Children's Court**. Milwaukee County Children's Court, operated by the Milwaukee County Department of Delinquency and Court Services, is located on the south side of Watertown Plank Road, 500 feet west of US 45.
- **Milwaukee County Parks System Headquarters**. The Milwaukee County Parks System headquarters is located on the north side of Watertown Plank Road, about 1,000 feet east of US 45. This building is on the National Register. See Section 3.25 and Section 4 for more information.
- **Milwaukee County Zoo**. See Section 3.26, Recreational Resources/Public Use Lands.

- **Milwaukee County Child and Adolescent Treatment Center.** The Milwaukee County Department of Delinquency and Court Services operates this center on the east side of US 45 south of Watertown Plank Road. The six buildings in this complex (Buildings A through F) house a UW Extension office, an auditorium, Plank Road School, the Milwaukee Academy, and the County's Focus Program. Parking for the center is on the northwest corner of the buildings adjacent to US 45. Open space, including an unused ball field, is northwest of the parking lot.

Milwaukee Regional Medical Center

Located east of US 45 at Watertown Plank Road, the 250-acre Regional Medical Center is home to several healthcare organizations, including Froedtert Hospital, Children's Hospital of Wisconsin, the Medical College of Wisconsin, Curative Care Network, and the Blood Center of Wisconsin (**Exhibit 3-18**). These organizations combined employ over 10,000 people.

Wisconsin State Fair Park

Wisconsin State Fair Park is located south of I-94, between 84th Street and 76th Street. State Fair Park serves the citizens of Wisconsin by providing a permanent site for the annual State Fair and other programs of civic interest. The State Fair Park Board manages State Fair Park, which is made up of several entities, including:

- The Wisconsin State Fair which runs for eleven days, typically in late July and early August. In 2007, 801,420 people attended the State Fair.
- The Milwaukee Mile racetrack, which has grandstand seating for approximately 40,000 spectators and hosts three major auto racing events every year, among other minor events.
- The Wisconsin Exposition Center, which is the state's largest exhibition hall at 200,000 square feet. The facility hosts a variety of consumer and trade shows throughout the year.
- The Pettit National Ice Center, which consists of a 400-meter speed-skating oval, a 450-meter jogging track, and two smaller ice rinks used for hockey, short-track speed skating, and figure skating. The facility seats 3,000 people and attracts approximately 500,000 visitors annually.
- The Tommy G. Thompson Youth Center provides housing for State Fair junior participants exhibiting at the Fair. The center also hosts overnight retreats and youth camps and is used for conferences, public meetings, and banquets.
- The RV Park is open year-round and provides 70 full-service RV hook-ups.
- The DNR Woodland Preserve, which features a park-like area with mature trees, a stream, pathways, and two enclosed pavilions on either end of the park that can be rented.

The area of State Fair Park that directly borders I-94 includes the fair parking lot, park sign, RV Park, and park-and-ride lot. The State Fair Park Board owns the parking lot adjacent to I-94 and is interested in developing the portion of the parking lot closest to I-94.

The 84th Street interchange and Greenfield Avenue interchange are the key freeway access points to the fairgrounds during the State Fair. Fairgoers that exit I-94 at 84th Street are directed east along the frontage road on the south side of I-94 to 76th Street, then south on 76th Street, creating a clockwise pattern around the fairgrounds.

3.8.2 Institutional and Public Service Impacts

Fire, Ambulance, and Police Protection

No-Build Alternative. The No-Build Alternative would not impact fire, ambulance, or police services within the study-area.

Modernization Alternatives. The Milwaukee Fire Department expressed some concern about accessing I-94 westbound from 84th Street under Alternative E1. The Texas U-turn arrangement would add 1 mile to the fire department's trip, increasing response time. Other effects on emergency services are not anticipated. All emergency services and access for these services will be maintained during construction.

Schools

No-Build Alternative. The No-Build Alternative would not impact study-area schools.

Modernization Alternatives. Under both the 6-lane and 8-lane Modernization Alternatives, the Bluemound Road northbound off-ramp from US 45 would cross the Milwaukee Montessori School property west of the school's building. Alternative N1 would acquire between 0.8 acre (6-lane) and 1.0 acre (8-lane) from the school playground. Both the 6-lane and 8-lane N3 Alternatives would acquire 0.5 acre from the school playground. Swing sets and part of the playground open space would be affected. The school's ability to attract younger students could decrease if the freeway is shifted closer to the school, according to school officials, because of green space loss and increased noise. The alternatives would not require relocating the school.

None of the Modernization Alternatives would require buying land from Wauwatosa West High School, Whitman Elementary, Plank Road School, or River Hills School, adjacent to US 45 in the Child and Adolescent Treatment Center. The pedestrian overpass over US 45, between Wauwatosa West and Whitman, would be left in place or replaced.

Good Shepherd's Lutheran School would be about 80 feet from the southbound exit to Greenfield Avenue. Currently, the school is between 83 and 110 feet from the ramp.

Lamb of God Lutheran School's playground is about 25 feet from the northbound entrance to I-894/US 45 from Lincoln Avenue. After reconstruction, the ramp would be approximately the same distance from the playground. At the north end of the school's lot, the ramp would be 25 to 30 feet closer to the school's parking lot/playground than it is today.

Access to the study-area schools will remain as it is today. No changes in school district boundaries are anticipated as a result of the proposed action.

Places of Worship

No-Build Alternative. The No-Build Alternative would not impact places of worship in the study area.

Modernization Alternatives. All of the Modernization Alternatives would acquire property from St. Therese Church on the east side of US 45 on Bluemound Road. The off-ramp from US 45 to Bluemound Road would cross the St. Therese Church property, west of the church building. The 6-lane N1 Modernization Alternative would acquire about 1.3 acres from the church

property while the 8-lane N1 Modernization Alternative would acquire 1.4 acres from the church property. Alternative N3 would acquire between 0.8 acre (6-lane) and 1.1 acres (8-lane) from the church. Potential effects from the loss of church property include less area for the parish festival and seasonal Christmas tree sales. Other concerns identified by the church include increased noise from the closer proximity of the ramp, and changes to available parking along Bluemound Road.

St. Mark's Lutheran Church would not be directly affected. All the Modernization Alternatives would remove the Bluemound Road exit ramp from US 45, which is currently across the street from the church. Under Modernization Alternative N1, 95th Street would no longer be a through street; a cul-de-sac would be built at the north end. A new service road would replace the exit ramp to Bluemound Road and would connect to 95th Street across from the church. Under Modernization Alternative N3, 95th Street would remain a through street but would not connect to the new service road.

Faith United Methodist Church would not be directly affected by any of the Modernization Alternatives. Adler Street would remain in its current location in front of the church. Under Alternative E1, the church building would be about 130 to 140 feet from the freeway (compared to 170 feet today). Under the E1/E3 Hybrid Alternative, the church building would be 100 to 115 feet from the freeway. Further east of the church, the 84th Street exit ramp would require Adler Street to be aligned to the south, resulting in several residential relocations.

Good Shepherd's Evangelical Lutheran Church is north of the Good Shepherd's School. Under all the Modernization Alternatives, I-894/US 45 would be about 80 feet from the church, compared to about 130 feet today. Unlike Good Shepherd's School, there is currently a noise wall between the freeway and church.

Woodlawn Lutheran Church on Lincoln Avenue would not be any closer to US 45 or the entrance ramp than it is today.

The Church in Milwaukee and Martin Luther Lutheran Church would not be affected.

St. Charles Youth and Family Services

No-Build Alternative. The No-Build Alternative would not impact the St. Charles Youth and Family Services Agency.

Modernization Alternatives. The east leg Modernization Alternatives would not directly impact the St. Charles Youth and Family Services property on 84th Street. The E1/E3 Hybrid Alternative would result in I-94 being moved closer to the school property. St. Charles staff did not indicate a concern over either east leg Modernization Alternative, but asked that their outdoor play equipment be moved further from the freeway under the E1/E3 Hybrid Alternative. St. Charles staff noted that any increase in traffic on southbound 84th Street approaching I-94 would block their driveway, causing difficulty for their students crossing 84th Street to and from the bus stop.

Both N1 and N3 Alternatives would require acquisition of Building F, which houses the Focus Program, adjacent to US 45. The youth services Milwaukee County/St. Charles provide in this building would need to be relocated.

Boy Scouts of America

No-Build Alternative. The No-Build Alternative would not impact the Walter and Olive Stiemke Scout Service Center.

Modernization Alternatives. The Walter and Olive Stiemke Scout Service Center would not be relocated under Modernization Alternatives E1 or the E1/E3 Hybrid Alternatives, but about 0.1 acre would be acquired from the south side of the property under all the Modernization Alternatives. O'Connor Street would be about 12 to 16 feet from the south side of the scout building, compared to 45 feet today.

Milwaukee County Buildings and Facilities

No-Build Alternative. The No-Build Alternative would not impact any Milwaukee County DPW, Sheriff's Department, Children's Court, or Child and Adolescent Treatment Center buildings on Watertown Plank Road.

Modernization Alternatives. The Modernization Alternatives would affect Milwaukee County buildings and facilities to varying degrees:

- **Milwaukee County DPW.** Both the 6- and 8-lane Modernization Alternatives would acquire between 2.5 acres (Alternative N3) and 2.9 acres (Alternative N1) from an area currently used as surface parking and outdoor vehicle storage. The surface parking area is heavily used as a park-and-ride lot during summer festivals, including Summerfest and State Fair Park.
- **Sheriff**. The Sheriff's Department patrol substation would not be affected by either the 6-lane or 8-lane Modernization Alternatives.
- **Children's Court**. Milwaukee County Children's Court would not be affected by either the 6-lane or 8-lane Modernization Alternatives.
- **Milwaukee County Parks System Headquarters**. The Milwaukee County Parks System headquarters will not be directly affected by either to the 6-lane or 8-lane Modernization Alternatives. The northbound entrance ramp from Watertown Plank Road to US 45 would be approximately 500 feet west of the building, compared to approximately 1,000 feet today. Watertown Plank Road would be approximately 220 feet from the south face of the building, compared to 320 feet today. See Section 3.25 and Section 4 for more information.
- **Milwaukee County Zoo**. See Section 3.26, Recreational Resources/Public Use Lands.
- **Milwaukee County Child and Adolescent Treatment Center.** One of the six buildings in this complex (Building F, see **Exhibits 3-19 and 3-20**) would be relocated under both the 6-lane and 8-lane Modernization Alternatives. Building F is one of two buildings that house the Focus Program. The open space would also be acquired as would a portion of a parking lot used by the Child and Adolescent Treatment Center.

Milwaukee Regional Medical Center

No-Build Alternative. The No-Build Alternative would not impact the institutions located on the Regional Medical Center grounds.

Modernization Alternatives. The 6-lane and 8-lane Modernization Alternatives would not affect the institutions in the Regional Medical Center.

Wisconsin State Fair Park

No-Build Alternative. The No-Build Alternative would not impact State Fair Park.

Modernization Alternatives. All the Modernization Alternatives would acquire some land from the Wisconsin State Fair Park/Pettit Center parking lot adjacent to I-94 and the park's main signage visible from the freeway (**Exhibit 3-19**). The State Fair Park Board has indicated that easy freeway access and traffic circulation patterns for their patrons are important factors (Appendix D, page D-33). Preserving their parking lot for parking and special events is also important to the State Fair Park Board. The Board prefers the E1/E3 Hybrid Modernization Alternative because it impacts the least right-of-way and most closely replicates the existing State Fair ingress and egress patterns. The Wisconsin Exposition Center (Appendix D, page D-59) and Pettit National Ice Center also prefer the E1/E3 Hybrid Alternative.

6-lane E1 Alternative. Approximately 6.6 acres would be acquired from the State Fair Park/Pettit Center parking lot along I-94, removing approximately 830 parking spaces. State Fair Park's current traffic flow pattern could remain in place for patrons arriving at the fair via I-94. Patrons exiting the fair via 84th Street to I-94 would use the Texas U-turn arrangement and travel east to 76th Street, turn around on the service drive, and then enter I-94 westbound.

The combined service drive option would reduce the State Fair Park/Petit Center right-of-way acquisition to approximately 4.0 acres, or 440 parking spaces from the Petit Center and State Fair Park.

8-lane E1 Alternative. Approximately 7 acres would be acquired from the State Fair Park/Pettit Center parking lot, representing approximately 850 parking spaces (730 parking spaces from State Fair Park and 120 from the Petit Center). Traffic flow issues would be the same as the 6-lane E1 Alternative. Additional freeway capacity would improve freeway traffic operations during the State Fair and other fairground events.

The combined service drive option would reduce the State Fair Park right-of-way acquisition to approximately 4.3 acres, or 480 parking spaces (430 parking spaces from the Petit Center and 50 from the Petit Center).

6-lane E1/E3 Hybrid Alternative. Approximately 5.3 acres would be acquired from the State Fair Park/Pettit Center parking lot along I-94, removing approximately 630 parking spaces. This alternative would allow the existing ingress patterns to remain intact.

8-lane E1/E3 Hybrid Alternative. Approximately 5.7 acres would be acquired from the State Fair Park/Pettit Center parking lot along I-94. This represents approximately 700 parking spaces (600 parking spaces from the State Fair Park and 100 from the Petit Center). The combined service drive option would reduce the parking impact to approximately 285 parking spaces (270 parking

spaces from State Fair Park and 15 parking spaces from the Petit Center). This alternative would allow the existing ingress patterns to remain intact.

3.8.3 Measures to Mitigate Adverse Institutional and Public Services Impacts

WisDOT and FHWA will fairly compensate schools, churches, Milwaukee County, and State Fair Park for buildings or land acquired as part of the project.

WisDOT and FHWA will work with State Fair Park Board and Pettit Center Board to develop options for replacing lost parking space, including construction of parking structures.

Milwaukee County may move its Focus Program out of the building that would be relocated under Modernization Alternatives N1 and N3, regardless of whether WisDOT acquires the building for US 45 reconstruction. WisDOT and FHWA will develop appropriate mitigation in conjunction with Milwaukee County. Finding a suitable off-site replacement location for the services Milwaukee County/St. Charles provide to at-risk youth in the Child and Adolescent Treatment Center would be difficult.

To minimize the amount of land required from institutional properties along the freeway corridor, service interchanges were designed with ramps that are located as close to the freeway mainline as possible.

3.9 Socioeconomic Characteristics

3.9.1 Affected Environment

Population Levels and Trends

Population in Waukesha County and the City of Brookfield grew 29 percent and 14 percent, respectively, between 1980 and 2000, while Milwaukee County, cities of Wauwatosa, West Allis, and Milwaukee had population declines of 3 to 8 percent over the same period (**Table 3-6**).

Demographic information on Waukesha County has been included because the west project terminus is 124th Street, which is the boundary between Milwaukee and Waukesha Counties. The data collection was based on a 1-mile buffer of the study area. As a result, information for Waukesha County, the Village of Elm Grove, and the City of Brookfield is provided.

TABLE 3-6
Population 1980–2000

Census	1980	1990	2000	Difference (1980–2000)	Percent Change (1980–2000)
Milwaukee	636,295	628,088	596,974	(39,321)	-6%
Wauwatosa	51,308	49,366	47,271	(4,037)	-8%
West Allis	63,982	63,221	61,254	(2,728)	-4%
Elm Grove	6,735	6,261	6,249	(486)	-7%
Brookfield	34,035	35,184	38,649	4,614	14%
Milwaukee County	964,988	959,275	940,164	(24,824)	-3%
Waukesha County	280,203	304,715	360,767	80,564	29%

Source: Department of Administration Demographic Services Center

All of the communities within a 1-mile radius of the study area experienced a population decrease between 1990 and 2000, mostly due to a decline in household size (see **Table 3-7**).

In 2000, minorities accounted for 10.0 percent of the population within a 3.5-mile by 5-mile perimeter around the study-area freeway system limits; 7.6 percent within a 1-mile buffer of the freeway centerline; and 12.1 percent within a 500-foot buffer from the freeway centerline (see **Table 3-8**). Conversely, 38 percent of Milwaukee County's population was minority in 2000. Between 1990 and 2000, the minority population in Milwaukee County and Waukesha County has grown annually by approximately 1.6 percent and 4.7 percent, respectively. Within study-area communities, minority populations have experienced differing levels of average annual growth, from 3.2 percent in the City of Milwaukee to 16.9 percent in the City of West Allis. In Milwaukee County, the largest minority population is African American, with 24.3 percent of the population. Hispanics, at 2.6 percent, are the largest minority population in Waukesha County (see **Table 3-9** and **Exhibit 3-20**).

TABLE 3-7
Study Area Population 1990–2000

Census	1990	2000	Difference (1990–2000)	Percent Change (1990–2000)
Milwaukee	24,141	23,454	(687)	-3%
Wauwatosa	29,570	29,039	(531)	-2%
West Allis	41,747	40,938	(809)	-2%
Elm Grove	3,706	3,633	(73)	-2%
Brookfield	5,966	5,799	(167)	-3%

Source: U.S. Census Bureau

TABLE 3-8
Study Area Minority Population 1990–2000

	1990 Minority Population (% of total population)	2000 Minority Population (% of total population)	Average Annual Percent Change (1990–2000)
Brookfield	1,304 (3.7%)	2,598 (6.7%)	9.9%
Elm Grove	165 (2.6%)	228 (3.6%)	3.8%
Milwaukee	246,374 (39.2%)	325,985 (54.6%)	3.2%
Wauwatosa	1,686 (3.4%)	3,336 (7.1%)	9.8%
West Allis	1,791 (2.8%)	4,822 (7.9%)	16.9%
Milwaukee County	260,411 (27.1%)	356,683 (37.9%)	3.7%
Waukesha County	9,860 (3.2%)	20,862 (5.8%)	11.2%
(3.5-by-5-mile box)	-	8,826 (10.0%)	-
1-mile radius	-	4,175 (7.6%)	-
500-foot radius	-	683 (12.1%)	-

Source: U.S. Census Bureau

TABLE 3-9
Minority Population by Race (2000)

	Asian and Pacific Islander (% of total population)	American Indian (% of total population)	African American (% of total population)	Hispanic (% of total population)	Other (% of total population)	Total Minority Population (% of total population)
Milwaukee County	24,203 (2.6%)	5,735 (0.6%)	228,471 (24.3%)	82,406 (8.8%)	15,868 (1.7%)	356,683 (38%)
Waukesha County	5,411 (1.5%)	685 (0.2%)	2,570 (0.7%)	9,503 (2.6%)	2,693 (0.7%)	20,862 (5.8%)
(3.5-by-5-mile area)	1,536 (1.7%)	521 (0.6%)	2,386 (2.7%)	2,195 (2.4%)	2,188 (2.4%)	8,826 (10.0%)
1-mile radius	1,118 (2.1%)	226 (0.4%)	893 (1.6%)	1,370 (2.5%)	568 (1.0%)	4,175 (7.6%)
500-foot radius	253 (4.5%)	28 (0.5%)	145 (2.6%)	166 (2.9%)	91 (1.6%)	683 (12.1%)

Source: U.S. Census Bureau

Population projections prepared by the Wisconsin Department of Administration anticipate population growth in all study-area communities, except Elm Grove. Elm Grove is expected to experience a 10 percent population decline between 2000 and 2025 (see **Table 3-10**). Brookfield and West Allis are expected to experience the most growth with a 7 percent increase between 2000 and 2025. Waukesha and Milwaukee counties are projected to grow by 18 and 9 percent, respectively.

TABLE 3-10
Projected Population 2000–2025

Community	2000 Population	2025 Population Projection	Increase (Decrease)	Percent Change
Milwaukee	596,974	622,738	25,764	4%
Wauwatosa	47,271	47,518	247	<1%
West Allis	61,254	65,238	3984	7%
Elm Grove	6,249	5,597	(652)	-10%
Brookfield	38,649	41,179	2,530	7%
Milwaukee County	940,164	1,021,406	81,242	9%
Waukesha County	360,767	424,472	63,705	18%

Source: U.S. Census Bureau (2000)

Households

The number of households in the region has increased at a higher rate than population growth and is expected to continue. However, the average household size is expected to continue its historic decline, with a somewhat moderate rate of decline in the coming decades (SEWRPC, 2004b). The number of households influences the number of trips made in the region. Between 2000 and 2035, the number of households in Milwaukee County is expected to increase 13 percent and by 29 percent in Waukesha County.

Income

Based on 2000 Census data, the median household income in the corridor was higher than the average median household income for Milwaukee and Waukesha counties, and was higher than the statewide median (see **Table 3-11**).

TABLE 3-11
Median Household Income (2000)

Community	Median Household Income
Milwaukee and Waukesha County	$45,956
Milwaukee County	$39,346
Waukesha County	$64,570
3.5-by 5-mile box	$47,371
1-mile radius	$48,070
500-foot radius	$46,556

Source: Department of Administration Demographic Services Center

Following the Office of Management and Budget's Statistical Policy Directive 14, the Census Bureau uses a set of income thresholds that vary by family size and composition to determine who is in poverty. If a family's total income is less than the family's threshold, then individuals in that family are considered to be in poverty. The official poverty thresholds do not vary geographically, but they are updated for inflation using the Consumer Price Index. For example, in 2007, a family of four with two children under the age of 18 would be considered in poverty if the family's total income was less than $21,027 (U.S. Census Bureau, 2008).

The percentage of persons living in poverty is lower in the project corridor than it is in Milwaukee County and Waukesha County. **Exhibit 3-21** shows the density of persons living in poverty. Roughly 5 percent of people living within 1 mile of the study-area freeway system are in poverty, compared to an average of 12 percent of people in Milwaukee County and Waukesha County.

School Demographics

Three Wauwatosa School District schools are located adjacent to the study corridor. Students attending Wauwatosa West High School and Whitman Middle School display race and income characteristics that differ from the surrounding neighborhoods. During the 2008-2009 school year Wauwatosa West High School students are 70 percent white, 20 percent African American, 4 percent Hispanic, and5 percent Asian American. In the same school year, Whitman Middle School students were 70 percent white, 16 percent African American, 9 percent Asian American, and 5 percent Hispanic. Approximately 15 percent of students at both schools are eligible for subsidized lunches. Eligibility is based on a student's household income. In the 2008–2009 school year, 13 students are enrolled at Plank Road School. Approximately 92 percent of the students are African American and 8 percent are white while approximately 85 percent of the students are eligible for subsidized lunches. (Wisconsin's Information Network for Successful Schools, 2009).

One school in the West Allis-West Milwaukee School District is located near the Zoo Interchange study area. Irving Elementary School is located approximately 300 feet west of the southbound I-894/US 45 exit ramp. The school displays race and income characteristics that differ from the surrounding neighborhoods. Students of Irving Elementary School are 69 percent white, 17 percent Hispanic, 7 percent African American, and 7 percent Asian American. Approximately 44 percent of the students are eligible for subsidized lunches (Wisconsin's Information Network for Successful Schools, 2009).

There are also two private schools located adjacent to I-894/US 45 in West Allis. Nine percent of the students at Lamb of God Evangelical Lutheran School are non-white, while three percent of students enrolled at Good Shepherd's Evangelical Lutheran School are minority (Private School Review, 2008).

The St. Charles Youth and Family Services complex on 84th Street is home to three different schools, including a Milwaukee Public Schools alternative school. The intensive day treatment program, the youth and family exceptional education program, and the behavioral program had a combined total of 62 students during the 2008–2009 school year. Of the total students, 87 percent are African American; 8 percent are Hispanic; and 5 percent are white. Sixty-eight percent of the students at the schools are eligible for subsidized lunches (Wisconsin's Information Network for Successful Schools, 2009). These race and income characteristics differ from the surrounding neighborhoods.

The Milwaukee Montessori School is the one private school located in the City of Milwaukee that is adjacent to the Zoo Interchange study corridor. Thirty-five percent of the school's enrollment is minority.

Non-English Speaking

No non-English speaking population was identified during public outreach activities.

Employment

Table 3-12 shows the historic and projected employment for Milwaukee and Waukesha counties, based on SEWRPC data. The table compares employment growth between 1970 and 2000, and potential growth between 2000 and 2035. The projected employment outlook for Milwaukee County is anticipated to slow, while the projected employment in Waukesha County is expected to continue to grow. Milwaukee County is expected to add 300 jobs between 2000 and 2035, while Waukesha County is expected to add 76,400 jobs. Milwaukee County's employment is expected to remain steady and continue to be an employment hub for southeast Wisconsin.

TABLE 3-12
Historic and Projected Employment for Milwaukee and Waukesha Counties

Employment Estimates	1980	1990	2000	2035	Difference 2000–2035	Percent Change 2000–2035
Milwaukee County	583,200	609,800	624,600	624,900	300	<1%
Waukesha County	132,800	189,700	270,800	347,200	76,400	28%

Source: SEWRPC. The Economy of Southeastern Wisconsin, Technical Report No. 10, 4th Edition, July 2004. 2035 Projection represents the SEWRPC's intermediate projection for employment.

Table 3-13 shows the distribution of jobs between various sectors of the economy from 1990 to 2000. Milwaukee County's job loss in agriculture, construction, manufacturing, wholesale and retail trade, finance, insurance, and real estate has been offset by an increase in transportation, communication and utilities, service, and other sector employment, for a modest overall increase in the number of jobs between 1990 and 2000. In Waukesha County, most sector jobs increased, while the percentage of agriculture jobs declined between 1990 and 2000. Job loss in agriculture has been offset by an increase in every other sector of employment, contributing to an overall increase in the number of jobs between 1990 and 2000.

TABLE 3-13
Job Distribution

Industry Sector	1990		2000		Percent Change 1990–2000
	Number	Percent of Total	Number	Percent of Total	
Milwaukee County					
Agriculture	266	<1%	128	<1%	-52%
Construction	18,859	3%	17,813	3%	-6%
Manufacturing	110,768	18%	90,010	14%	-19%
Transportation, Communication, and Utilities	29,467	5%	34,299	5%	16%
Wholesale Trade	30,405	5%	27,912	4%	-8%
Retail Trade	103,307	17%	92,746	15%	-10%
Finance, Insurance, and Real Estate	54,337	9%	52,627	8%	-3%
Services	196,657	32%	242,826	39%	23%
Government and Government Enterprises	63,452	10%	63,291	10%	0%
Other	2,269	<1%	2,987	<1%	32%
Total Employment	609,787	100%	624,639	100%	2%
Waukesha County					
Agriculture	1,191	<1%	1,011	<1%	-15%
Construction	12,679	7%	18,462	7%	46%
Manufacturing	44,871	24%	56,754	21%	26%
Transportation, Communication, and Utilities	8,185	4%	9,516	4%	16%
Wholesale Trade	16,128	9%	22,508	8%	40%
Retail Trade	31,054	16%	43,132	16%	39%
Finance, Insurance, and Real Estate	13,131	7%	22,340	8%	70%
Services	46,293	24%	76,265	28%	65%
Government and Government Enterprises	13,994	7%	17,059	6%	22%
Other	2,135	1%	3,749	1%	76%
Total Employment	189,661	100%	270,796	100%	43%

Source: SEWRPC. The Economy of Southeastern Wisconsin, Technical Report No. 10, 4th Edition, July 2004.

Transportation

In Milwaukee County, 28,363 workers, or 4.5 percent of workers, use public transportation as a means to commute to work. Conversely 1,134 workers, or less than 1 percent, use public transportation as a means to commute to work in Waukesha County. Of the workers that live within a 1-mile radius of the study-area freeway system, 640, or 2 percent, use public transportation.

In Milwaukee County, 31,505 workers, or 5 percent of workers, have no vehicle available for commuting, while in Waukesha County, 2,482 workers, or 1 percent, are in the same situation. There are 763 workers, or 3 percent, within a 1-mile radius of the study-area freeway system that have no vehicle available for commuting.

Health Condition

Some groups have raised concerns about the potential health-related impacts to residents living near freeways and other high-volume roads, primarily from airborne pollutants emitted from motor vehicle engines and other sources. Data on community health is typically aggregated at the county level and difficult to find below the county level.

Carbon monoxide may reduce the amount of oxygen distributed throughout the body by the blood stream. Nitrogen oxides are one of the main precursors in the formation of ground-level ozone and may affect the delicate structure of lung tissue. Fine particulate matter can penetrate the sensitive respiratory tract and affect health. Sensitive individuals may be affected by low-level pollutant exposure. All three of these pollutants are emitted from vehicle engines, among other sources (see Section 3.20, Air Quality).

WisDOT and FHWA investigated asthma rates, which are related to air quality. Asthma rates for Milwaukee County are higher than that of the State of Wisconsin. According to the Wisconsin Department of Health and Family Services, Milwaukee County's asthma prevalence value is 13.6 percent, compared to the 12.1 percent rate for the State of Wisconsin. In 2005, Milwaukee County had the highest rate of asthma-related emergency room visits and hospitalizations in the state. According to the National Center for Health Statistics, the asthma mortality rate for Milwaukee County is 17.3 deaths per million, the highest of Wisconsin's 72 counties. This is compared to an asthma mortality rate of 13.2 deaths per million for the entire State of Wisconsin (Wisconsin Asthma Coalition, 2007).

Age

The median age for Milwaukee County is less than the Wisconsin statewide median age, while the median age in Waukesha County is higher than the statewide median. According to 2000 Census data, the median age in Wisconsin is 36.0. The median age in Milwaukee and Waukesha counties are 33.7 and 38.1, respectively. Additionally, 74.5 percent of the population in Wisconsin is age 18 and over, while the population of age 65 and over is 13.1 percent. Both Milwaukee and Waukesha counties have higher percentages of populations age 18 and over and age 65 and over than the state average.

Based on public outreach during the study, there does not appear to be a large elderly population in the Zoo Interchange study area. However, St. Camillus Retirement Community is located on Bluemound Road, about 0.25 mile west of US 45.

Disability

Based on 2000 Census data, persons with a disability account for 18.1 percent and 10.8 percent of the Milwaukee and Waukesha County populations, respectively. Persons with a disability are located within the study corridor at about the same rate as Milwaukee and Waukesha counties as a whole.

3.9.2 Socioeconomic Impacts

Neighborhood and Community Cohesion

The impacts of reconstructing and possibly expanding the study-area freeway system can affect the physical and social setting, community services, and other factors that promote a sense of community among residents in the study area. Community cohesion includes buildings and services, such as churches, commercial development, social services, municipal buildings and services, parks, and schools.

Relocations of residential and commercial properties are the primary contributors to impacts on community cohesion. In the majority of cases, relocations occur along the edges of established neighborhoods surrounding the existing freeway system. All existing crossroads over/under the freeway corridor would remain (see Section 3.5.2).

Isolation of Distinct Groups, Real or Perceived

Since the proposed action would not create a new corridor, no isolation of distinct groups is anticipated beyond the existing condition (see Section 3.5.2).

New Development Assisted or Discouraged by the Project

See Section 3.2, Indirect Effects.

Changes in Property Values

Residents who live near the study-area freeway system have expressed concern over the potential for their property values to decrease if the freeway is closer to their homes after it is reconstructed. This concern is frequently cited in regard to highway reconstruction projects. Home resale values are affected by numerous variables, including location, home condition, mortgage rates, and the economy. As a result, it is impossible to state if there will or will not be an increase or decrease in property values as a result of the Modernization Alternatives. While there has been some research on this topic, it is difficult to rely on the results of a study to draw meaningful conclusions given the variables mentioned above. Additionally, WisDOT will fairly compensate property owners whose property is acquired as part of the project (see Section 3.5.3).

Tax Base Impacts

For the Modernization Alternatives some private buildings and property would be acquired by the state, thereby removing it from local tax rolls. WisDOT assessed the potential tax base loss for the cities of Milwaukee, Wauwatosa, and West Allis. WisDOT also calculated the annual property tax revenue loss for each city. This was calculated using the city tax rate for each city. This information was obtained from each city's assessor's office. (Note: The city tax rate consists of money going to the city and does not include tax for such entities as school districts, Milwaukee Area Technical College, and MMSD.) In 2008, the city tax rate per $1,000 taxed was $8.09 for Milwaukee, $6.69 for Wauwatosa, and $8.81 for West Allis.

The tax base impact for each alternative was determined using 2007 assessment figures. The full assessed value of the property was used for properties that would be acquired. For those properties where only a portion of land would be acquired, the percentage of land taken from the property was multiplied by the total assessed value of the property to determine the impact on the property tax base. There are several institutional uses in the study area (Milwaukee County Zoo, Milwaukee Regional Medical Center, parks, etc.). These uses are not included on the local municipality's property tax roll. **Table 3-14** lists the tax base loss and property tax revenue loss for each alternative. In most cases, the 8-lane alternatives would have a greater impact on the property tax base than the 6-lane alternatives.

TABLE 3-14
Tax Base Impacts

Alternative		City of Milwaukee		City of Wauwatosa		City of West Allis	
		Tax Base Loss	Property Tax Revenue Loss	Tax Base Loss	Property Tax Revenue Loss	Tax Base Loss	Property Tax Revenue Loss
North Leg							
N1 w/ single loop at North	6-lane	$400	$3	$800,000	$5,400	$0	$0
	8-lane	$400	$3	$1,450,000	$9,700	$0	$0
N1 w/ double loop at North	6-lane	$400	$3	$800,000	$5,400	$0	$0
	8-lane	$400	$3	$1,450,000	$9,700	$0	$0
N3 w/ single loop at North	6-lane	$0	$0	$800,000	$5,400	$0	$0
	8-lane	$400	$3	$1,480,000	$9,900	$0	$0
N3 w/ double loop at North	6-lane	$0	$0	$800,000	$5,400	$0	$0
	8-lane	$400	$3	$1,480,000	$9,900	$0	$0
East Leg							
E1	6-lane	$0	$0	$0	$0	$0	$0
	8-lane	$0	$0	$0	$0	$0	$0
E1 w/ combined service drive	6-lane	$0	$0	$0	$0	$0	$0
	8-lane	$0	$0	$0	$0	$0	$0
E1/E3 Hybrid	6-lane	$1,940,000	$15,700	$0	$0	$0	$0
	8-lane	$2,540,000	$20,500	$0	$0	$0	$0
South Leg							
S2	6-lane	$0	$0	$0	$0	$1,470,000	$13,000
	8-lane	$0	$0	$0	$0	$1,520,000	$13,400
S2 w/ EB I-94 access to Greenfield Ave.	6-lane	$0	$0	$0	$0	$2,290,000	$20,200
	8-lane	$0	$0	$0	$0	$2,350,000	$20,700
West Leg							
W3	6-lane	$0	$0	$3,250,000	$21,700	$0	$0
	8-lane	$0	$0	$4,380,000	$29,300	$27,800	$240
Core Interchange							
Core Interchange	6-lane	$16,000	$130	$0	$0	$980,000	$8,600
	8-lane	$30,000	$200	$0	$0	$980,000	$8,600

The City of Milwaukee had a full value tax base of $31.9 billion in 2007 (Wisconsin Department of Revenue, 2008). On the east leg, the 6- and 8-lane E1 and E1 with combined service drive Alternatives would not impact any taxable property. The 8-lane E1/E3 Hybrid Alternative would require the displacement of 20 residences, one business and acquisition of approximately 10 acres of property in the City of Milwaukee. The 2007 assessed value of these properties was approximately $2,540,000, or 0.008 percent of the City of Milwaukee's full value tax base. Using current tax rates, this would result in an annual property tax loss of approximately $20,500 for the City of Milwaukee. The 6-lane E1/E3 Hybrid Alternative would require the displacement of 19 residences, one business and acquisition of approximately 8 acres of property and would result in approximately $4,800 less in property tax revenue loss than the 8-lane E1/E3 Hybrid Alternative.

Through the core of the Zoo Interchange, the 6-lane and 8-lane Alternatives would result in a loss of approximately $16,000 and $30,000, respectively, to the Milwaukee property tax base. This would cause an annual loss of approximately $130 for the 6-lane Alternative and $200 for the 8-lane Alternative to Milwaukee's property tax revenue.

The 2007 full value tax base for the City of Wauwatosa was $5.8 billion (Wisconsin Department of Revenue, 2008). Along the east leg, south leg, and the core of the Zoo Interchange, no residential or commercial properties would be displaced, and no land would be acquired in Wauwatosa. The total loss in assessed value to the City of Wauwatosa tax base would be between $1.45 million and $1.48 million on the north leg for the 8-lane Alternatives (approximately 0.025 percent of Wauwatosa's full tax base). Using current tax rates, this would result in an annual property tax revenue loss between $9,700 and $9,900 for the City of Wauwatosa. The reason for the similarities between the single loop at North Avenue and double loop at North Avenue alternatives is that construction for both loop alternatives would take place within existing WisDOT right-of-way, thus there would be no tax base loss. The 6-lane Alternatives would result in an annual property tax loss of approximately $5,400 as a result of relocations and property takings along the north leg.

On the west leg, the 6-lane and 8-lane W3 Alternative would acquire one business and a portion of property from another business in Wauwatosa. The total loss in assessed value to the City of Wauwatosa as a result of the 6-lane W3 Alternative would be an estimated $3.25 million (0.06 percent of Wauwatosa's full tax base) while the loss for the 8-lane W3 Alternative would be $4.38 million (0.08 percent of Wauwatosa's full tax base). This would result in approximate annual property tax revenue loss of $21,700 for the 6-lane W3 Alternative and $29,300 for the 8-lane W3 Alternative for the City of Wauwatosa.

For the City of West Allis, impacts to the property base would only occur along the south leg, west leg and in the core of the Zoo Interchange. In 2007, the full value tax base for West Allis was $4.5 billion (Wisconsin Department of Revenue, 2008). On the south leg, the total loss in assessed value to the West Allis tax base for the 8-lane S2 Alternative would be approximately $1.52 million or 0.03 percent of the City's total tax base. Using current tax rates, this would result in an annual property tax revenue loss of approximately $13,400 for West Allis. This figure would be approximately the same for the 6-lane S2 Alternative along the south leg. If access to Greenfield Avenue from eastbound I-94 is provided, there would be a loss of approximately $2.29 million to West Allis' tax base for the 6-lane Alternative and $2.35 million for the 8-lane S2 Alternative. These totals are approximately .05 percent of West Allis' full value tax base. The S2 6- and 8-lane Alternatives with eastbound I-94 access

to Greenfield Avenue would result in an annual property tax revenue loss of approximately $20,200 and $20,700, respectively, for West Allis.

Rebuilding the core of the Zoo Interchange would result in a tax base loss of $980,000 for West Allis and a property tax revenue loss of $8,600.

Changes in Travel Patterns

See Section 3.3.2, Transportation Impacts.

Changes in School Districts

No changes in school district boundaries are anticipated as a result of the proposed action. See Section 3.8.2, Institutional and Public Service Impacts.

Effect on Community Facilities and Services

All Modernization Alternatives would relocate the Zoofari Conference Center. US 45 would be closer to the Wil-O-Way Underwood Recreation Center under all the Modernization Alternatives. See Section 3.26, Recreational Resources, for more information.

Alternative N1 would require relocation of one building of the Milwaukee County's Mental Health Complex. In addition to the mental health services in this building, St. Charles Youth and Family Services provides services through contracts with Milwaukee County. The county is considering whether or not to relocate the entire complex; that determination is independent of the Zoo Interchange reconstruction.

Effect on Social Groups

WisDOT developed and implemented a public involvement program to assess the project's effect on several social groups. Section 5.1, Public Involvement, provides more information on these groups.

Elderly. The No-Build Alternative would not directly affect elderly residents. Under the Modernization Alternatives, some residential relocations would include elderly occupants.

Handicapped. US 45 would be closer to the Wil-O-Way Underwood Recreation Center under all the Modernization Alternatives. See Section 3.26, Recreational Resources, for more information. Based on its public outreach efforts, WisDOT is not aware of any other direct impacts to handicapped residents or facilities that serve handicapped users.

Non-Drivers and Transit Dependents. The proposed improvements would affect non-drivers less than drivers who use the study-area freeway system regularly. Compared to the Modernization Alternatives, the No-Build Alternative would have higher crash rates and congestion, but would not have an adverse effect on non-drivers to the extent it would on drivers that use the study-area freeway system on a regular basis. Conversely, non-drivers and transit dependents would not experience the benefits of the Modernization Alternatives to the extent that drivers would. Efficient movement of goods and services on the study-area freeway system would benefit non-drivers and transit dependents to the same extent as other social groups.

Transit routes and their riders that use the study-area freeway system would benefit from the improved safety under both the 6-lane and 8-lane Modernization Alternatives, and the reduced congestion under the 8-lane Modernization Alternatives. Adding capacity to the

study-area freeway system will reduce traffic volumes on some local streets near the corridor compared to the 6-lane Modernization Alternatives.

Some groups feel that investing in added capacity for the study-area freeway system would have an adverse impact on transit dependent and non-drivers because they would not benefit from the added capacity and because of the increased costs of adding capacity would mean fewer funds available for mass transit. See the following section, Environmental Justice, for a more thorough discussion of this issue.

Environmental Justice

The key regulations and policy directives behind environmental justice assessment requirements are Title VI of the Civil Rights Act of 1964 and Executive Order 12898 issued by President Clinton in 1994.

Title VI of the Civil Rights Act of 1964[1] prohibits intentional discrimination, as well as disparate impact discrimination, which results when a facially neutral policy has disparate impacts on protected population groups. To clarify and amplify the non-discrimination requirements of Title VI President Clinton issued Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations."

Presidential Executive Order on Environmental Justice 12898 requires each federal agency to address the impacts of their programs with respect to environmental justice. The Executive Order states that, to the extent practicable and permitted by law, neither minority nor low-income populations may receive disproportionately high or adverse impacts as a result of a proposed project. The order also requires that representatives of any low-income or minority population that could be affected by the project be given the opportunity to be included in the impact assessment and public involvement process.

FHWA guidance on "Addressing Environmental Justice in Environmental Assessments/Environmental Impact Statements" outlines the elements and steps to be followed when preparing an EIS and requires the following steps:

- Identification of existing populations
- Identification of coordination, access to information, and participation
- Identification of disproportionately high and adverse effects

WisDOT and FHWA completed an environmental justice analysis to determine whether the proposed project has the potential to incur disproportionately high and adverse effects[2] upon minority or low-income populations.[3] If the high and adverse impacts are found to be borne

[1] Title VI states that "(n)o person in the United States shall, on the ground of race, color, or national origin be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance."

[2] Adverse effects are defined in FHWA Order 6640.23 as the totality of significant individual or cumulative human-health or environmental effects, including interrelated social and economic effects, which may include, but are not limited to: bodily impairment, infirmity, illness, or death; air, noise, and water pollution and soil contamination; destruction or disruption of man-made or natural resources; destruction or diminution of aesthetic values; destruction or disruption of community cohesion or a community's economic vitality; destruction or disruption of the availability of public and private facilities and services; vibration; adverse employment effects; displacement of persons, businesses, farms, or nonprofit organizations; increased traffic congestion, isolation, exclusion, or separation of minority or low-income individuals within a given community or from the broader community; and the denial of, reduction in, or significant delay in the receipt of, benefits of FHWA programs, policies, or activities.

[3] Disproportionately high and adverse effect on low-income and minority populations is defined in FHWA Order 6640.23 as (1) is predominately borne by a minority population and/or a low-income population; or (2) will be suffered by the minority population

disproportionately by low-income and minority populations, an analysis must examine mitigation measures, offsetting benefits, and impacts of other system elements in accordance with FHWA Order 6640.23, Actions to Address Environmental Justice in Minority Populations and Low-Income Populations issued in 1998.

WisDOT and FHWA determined the impacts to the general population and natural resources, and then assessed if those impacts would be disproportionately borne by low-income or minority groups. The following impact categories were identified:

- Indirect and cumulative effects
- Residential and business relocations
- Transportation
- Economic
- Institutional and public service
- Environmental
  - Water quality
  - Water quantity
  - Noise
  - Air quality
- Recreational/public use lands
- Construction impacts

Identification of Existing Minority and Low-Income Populations

To determine the presence of minority and low-income populations in the study area, WisDOT used localized census tract data supplemented by the study team's extensive public involvement program. The Zoo Interchange study area is located in Milwaukee County in Wisconsin, and includes the City of Milwaukee, City of Wauwatosa, and the City of West Allis. WisDOT identified the minority and low-income populations at three levels: (1) a 3.5-mile by 5-mile perimeter around the study-area freeway system limits, (2) within a 1-mile buffer of the freeway centerline, and (3) within a 500-foot buffer from the centerline to understand the impacts which potentially could be felt by the communities located adjacent to the freeway system.

Section 3.9.1 provided information on the minority populations located in Milwaukee and Waukesha counties. Within the 3.5-by-5 mile area, 1-mile buffer, and 500-foot buffer of the study-area freeway system, minorities made up 7.0 percent, 7.7 percent, and 12.1 percent of the population in 2000, respectively (see **Table 3-8**). The minority population in Milwaukee County and Waukesha County has grown by approximately 1.6 percent and 4.7 percent, respectively, each year between 1990 and 2000. Within study area communities, minority population has experienced differing levels of growth from 3.2 percent in the City of Milwaukee to 16.9 percent in the City of West Allis. In Milwaukee County, the largest minority population is African American with 24.3 percent of the population. Hispanics, at 2.6 percent, are the largest minority population in Waukesha County (see **Table 3-9**).

and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non-low-income population.

Based on 2000 Census data, the median household income in the study corridor was slightly higher than the median household income for Milwaukee and Waukesha counties, when combined, and was higher than the statewide median (see **Table 3-11**).

The number of persons living in poverty is lower in the project corridor than it is in Milwaukee County and Waukesha County, when combined (**Exhibit 3-21**). Roughly 5 percent of persons living within 1 mile of the study-area freeway system are in poverty, compared to 12 percent of persons in Milwaukee County and Waukesha County, when combined.

Identification of Minority Owned Businesses and Disadvantaged Business Enterprises

Most of the businesses located in the freeway system area are majority owned. The number of minority-owned businesses located within the 3.5-by-5 mile box,, 1-mile buffer and 500-feet buffer are 24, 26, and 2, respectively. The number of disadvantaged business enterprises (DBEs) in the same areas is 9, 8, and 3, respectively.

Outreach to Minority Communities

Section 5 describes the public involvement process developed by WisDOT to disseminate information on the project and to obtain public input. In addition to the efforts and initiatives described in Section 5, WisDOT specifically engaged the minority community to ensure their participation in the decision making process.

Communication efforts included the use of grassroots outreach through community-based organizations, local leadership, one-on-one communication, small discussion groups, and the convening of the Milwaukee County Urban DBE Advisory Committee and the Milwaukee County DBE Steering Committee. The Urban DBE Advisory Committee was created to improve coordination, communication, and planning of WisDOT's programs and projects within the communities affected by its projects. The committee consists of members drawn from a wide range of transportation industry businesses, agencies, and government. The DBE Steering Committee was created to involve key management-level stakeholders in the community and a wide range of participants drawn from labor associations and government agencies. For more information on these committees, including a list of members, see Section 5.1.13.

Identification of Disproportionately High and Adverse Effects

No-Build Alternative. While the No-Build Alternative would not have as many direct environmental impacts as the Modernization Alternatives, failure to address the condition of the study-area freeway system may result in higher crash rates and would have an adverse effect on low-income and minority residents, as well as the general population. In addition, the No-Build Alternative would have a higher level of congestion than the Modernization Alternatives.

Modernization Alternatives.
Indirect and Cumulative Effects. Section 3.2 describes the indirect and cumulative effects of the project.

Residential and Business Relocations. The Modernization Alternatives will require the relocations of 6 to 32 residences and 5 to 7 businesses adjacent to the study-area freeway system. As noted earlier in Section 3.9, the study-area freeway system has fewer minorities and

a higher income that the surrounding community. WisDOT canvassed the households that may be relocated and determined that one household that may be relocated is minority.

WisDOT is not aware of any minority-owned businesses that would be relocated as a result of the project.

Numerous homes, mostly on the east and south legs, would be closer to the freeway under all of the Modernization Alternatives. Census data, supplemented by door-to-door outreach and neighborhood meetings, indicates that few adjacent residences are minority owned/occupied. Census data suggests that income levels are above the Health and Human Services poverty guidelines within the study area, and higher than the Milwaukee County and Wisconsin averages (U.S. Census Bureau, 2008).

Institutional. The Modernization Alternatives will affect schools, Milwaukee County-owned facilities, and churches. The Modernization Alternatives would acquire 0.5 to 1.4 acres from St. Therese Catholic Church. Between 0.5 and 1.0 acre would be acquired from Milwaukee Montessori School's property as a result of the Modernization Alternatives. As noted in Section 3.9.1, Milwaukee Montessori School's enrollment is 35 percent minority; comparable to Milwaukee County's percentage and lower than the City of Milwaukee. Anecdotal evidence suggests that the percent of minority St. Therese parishioners is below the Milwaukee County and City of Milwaukee minority percentage.

Modernization Alternatives N1 and N3 would require relocation of a building from Milwaukee County's Youth and Adolescent Services complex. The building is used to provide services to youth as an alternative to prison. About 90 percent of the youths that receive services in the building are minority.

No police, fire, or ambulance services will be affected, nor will any residents be isolated from any of these services under either of the Modernization Alternatives.

Physical and Natural Environment. The environmental impacts of the proposed action are evaluated in Sections 3.11 through 3.22. Three areas of environmental impacts have potential impacts on people: water quality, noise, and air quality. Other environmental impacts such as wildlife, environmental corridors, visual/aesthetics were not assessed specifically for their potential environmental justice impact.

Water Quality and Water Quantity. The proposed reconstruction of the study-area freeway system will comply with more rigorous and recent state regulations regarding stormwater runoff from highways. As a result, less pollutants and suspended solids will be washed from the study-area freeway system into streams compared to the No-Build Alternative.

MMSD and the City of Wauwatosa are concerned about the increasing the risk of downstream flooding, as a result of increased runoff into Underwood Creek, Honey Creek and, ultimately, the Menomonee River. Menomonee River flooding in Wauwatosa and Milwaukee is an important issue. However, Menomonee River flooding in Wauwatosa (7 percent minority in 2000) and the Milwaukee's Valley Park neighborhood (46 percent minority in 2000, compared to 55 percent in the City of Milwaukee and 38 percent in Milwaukee County) does not have a disproportionate impact on low-income or minority groups.

Noise. The project's noise impacts are localized and confined to areas adjacent to the study-area freeway system. The median household income adjacent to the study-area freeway system is higher than average (see **Table 3-11**), and the percentage of minority residents adjacent to the study-area freeway system is lower than the average in each respective community (see **Table 3-9**).

Air Quality. The air quality impacts of the project are described in Section 3.2.2, Section 3.20, and Appendix C. The project is not expected to have an adverse effect on residents or students adjacent to the study-area freeway system. Carbon monoxide levels are expected to be below national standards, and southeast Wisconsin is in attainment for particulate matter, though that designation may change in 2009, based on recent exceedances. MSATs are expected to diminish under all of the Modernization Alternatives, primarily as a result of reduced emissions from new motor vehicles. WisDOT and FHWA reviewed Census data and conducted extensive public outreach efforts which indicated that there is not a large minority or low-income population within 1 mile of the study-area freeway system, compared to the population of Milwaukee, Wauwatosa, West Allis, Milwaukee County, and the State of Wisconsin (see **Tables 3-8 and 3-9 and Exhibits 3-20 and 3-21**). As a result, none of the Modernization Alternatives would have a disproportionately high and adverse impact on low-income or minority communities in terms of air quality impacts.

Recreational/Public Use Lands. All the Modernization Alternatives would affect 0.2 acre of Underwood Creek Parkway. For all Modernization Alternatives, approximately 0.5 acre of land would be acquired from Milwaukee County's Wil-O-Way Underwood Recreation Center. Milwaukee County does not maintain data on race and economic status of Wil-O-Way users. The director of the county's Office for Persons with Disabilities noted that disabled people tend to have higher unemployment rates than average and estimated that the race of Wil-O-Way users is comparable to Milwaukee County's minority percentage.

During WisDOT's outreach to minority groups and agencies that work with low-income residents, none raised concerns about this potential impact having a disproportionate impact on low-income or minority groups.

Construction Impacts. Construction impacts are described in Section 3.27. Construction impacts will be experienced primarily by residents, students and businesses adjacent to the study-area freeway system. Based on 2000 Census data and WisDOT's public outreach program, the percentage of minority residents living adjacent to the study-area freeway system is less than their respective communities as a whole. Good Shepherd's School, and Wauwatosa West and Whitman Elementary Schools have a lower minority percentage than the neighborhoods surrounding the schools. Milwaukee Montessori has a 35 percent minority enrollment, which is higher than other schools in the study area. It is comparable to Milwaukee County's minority percentage and lower than the City of Milwaukee minority percentage. Therefore, construction impacts will not disproportionately affect low-income or minority residents or students.

The median household income of residents adjacent to the freeway system is higher than the county and statewide median. Travelers on the study-area freeway system will experience inconveniences and additional delay during construction, but this will not affect minority or low-income populations disproportionately.

Transportation. The American Civil Liberties Union, Sierra Club, Black Health Coalition, National Association for the Advancement of Colored People, and the City of Milwaukee have raised the issue (on this or previous freeway studies) of highway funding levels versus transit funding levels. The groups' position is that expanding capacity of the study-area freeway system—in the context of SEWRPC's recommendation to expand freeway capacity throughout Southeast Wisconsin—will have a disproportionately adverse impact on low income and minority groups because:

- The state and federal funds required to pay for capacity expansion will reduce the opportunity to fund mass transit services that would benefit low-income and minority residents.
- These groups are less likely to have access to a vehicle and, therefore, less likely to benefit from the freeway capacity expansion compared to suburban commuters, who are more likely to be white and have higher income.

This issue is related to the groups' position, raised during SEWRPC's freeway system plan development, that the recommended expansion of the southeast Wisconsin freeway system violates Title VI of the 1964 Civil Rights Act by allocating money to freeways at the expense of transit. Title VI of the Civil Rights Act of 1964 prohibits discrimination on the basis of race, color, or national origin in programs and activities receiving Federal financial assistance. Specifically, Title VI provides that "no person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance" (42 U.S.C. Section 200d).

However, SEWRPC's recommendation to widen the southeast freeway system needs to be evaluated in the context of its overall transportation plan. The plan states that regional transportation design is a sequential process beginning with consideration of public transit facilities and services, bicycle and pedestrian facilities, and travel demand and transportation systems management measures. Highway system capacity improvement and expansion is considered to address highway traffic volume and congestion which cannot be expected to be alleviated by public transit, bicycle and pedestrian, and travel demand and transportation systems management measures (SEWRPC, 2006b). The plan recommends a 100 percent increase in transit, including rapid transit systems as well as local bus service (see Section 1). Also, public transit carries about 2 percent of total weekday travel in southeast Wisconsin while over 33 percent of the estimated capital and operating costs of the plan are devoted to public transit (SEWRPC, 2006b; Tables 34 and 125).

Furthermore, SEWRPC does not implement any of its recommendations. Local, county, state, or special districts implement recommendations for the transportation facilities and systems they have jurisdiction over as they see fit and funding allows.

Some minority and transit advocacy groups have stated that while a balanced transportation system is recommended, highways receive more funding than transit and as a result the level of transit services has stayed the same or decreased in recent years (after an expansion of transit service in Milwaukee in the late 1990s).

To address this, a discussion of WisDOT's role in developing and maintaining highways and transit systems is relevant. Wisconsin Statute 84.01(2) states, "The department [of transportation]

shall have charge of all matters pertaining to the expenditure of state and federal aid for the improvement of highways, and shall do all things necessary and expedient in the exercise of such supervision." Conversely, WisDOT does not operate or maintain any transit systems in the state.

However, at the direction of the state legislature WisDOT began providing funding to local transit systems for operating expenses in 1973, utilizing both state and federal funds. Eligible project costs are limited to the operating expenses of an urban mass transit system (Wisconsin Statute 84.20 and TRANS 4.04(1)). In 2004, WisDOT provided $98.7 million in state transit operating assistance to mass transit systems, and an additional $8 million in elderly and disabled transit assistance to counties. Fourteen states provided more state transit funding than Wisconsin that year, and ten of those fourteen states have a higher population than Wisconsin (USDOT, Bureau of Transportation Statistics, 2005).

State transit funding was anticipated at totals of $110 million in state transit aid in 2008. On average, state operating assistance covers about 37 percent of transit operating expenses statewide. Nearly $63.8 million of WisDOT's transit funding went to MCTS, representing 40 percent of MCTS's operating budget. WisDOT also provides about 46 percent of the Waukesha transit system's operating budget annually ($3.9 million in 2008) which includes funding for commuter bus service between Waukesha and Milwaukee. Federal funds also contribute to these transit systems.

Since 1989 Wisconsin has partnered with Illinois to provide operating support for Amtrak's Hiawatha service between Milwaukee and Chicago. Wisconsin provides 75 percent of the non-federal, non-Amtrak operating costs. From 2004 through 2007, Wisconsin averaged $5.9 million in annual operating support for Amtrak. In 2009, Wisconsin committed $137 million of federal funds for track improvements to accommodate future high-speed rail.

At the federal level, 15.5 percent of the federal gasoline tax (2.86 cents of the 18.4 cent per gallon tax) goes to the Mass Transit Account of the Highway Trust Fund.

The race and income of those who would benefit from the proposed action is difficult to assess, and impossible to quantify. The demographics of those who live near the study-area freeway system indicate that relatively few minorities live in the study area compared to Milwaukee County as a whole. Median household income of residents in the study area is higher than average.

Another factor to consider is that those who do not drive on the freeway system also benefit from it to some extent through the efficient movement of goods and services. A large percentage of consumer products and other freight are carried on trucks via the interstate system. It's beyond the scope of this study to assess the extent which improvements to the study-area freeway system affect consumer prices in the Milwaukee area.

Those that do not have access to an automobile will not often use the study-area freeway system, except potentially through local or inter-city bus travel. This population will not benefit from the proposed action as much as those who use the study-area freeway system on a regular basis. In Milwaukee County, those without access to an automobile are largely low-income City of Milwaukee residents. A 2004 UWM study cites Census figures that 81 percent of low-income residents in a four-county area (Milwaukee, Ozaukee, Washington, and Waukesha counties) live in Milwaukee County and 90 percent live in the City of Milwaukee. Over 36 percent of low-income residents in the four-county area do not

have access to a vehicle. In terms of race, two-thirds of bus commuters in the City of Milwaukee are minority (UWM, 2004). However, according to year 2000 Census data for southeast Wisconsin, while minority populations utilize transit more for traveling to work (18 percent of African Americans and 8 percent of Hispanics compared to 2 percent of whites) most commuting by minorities is by car (79 percent for African Americans and 88 percent for Hispanics compared to 95 percent for whites).

Economic. Section 3.27.1 describes the cost of the Modernization Alternatives. See the previous discussion regarding the equity issues that have been raised regarding the cost of expanding capacity of the study-area freeway system.

Summary

Based on WisDOT's public outreach, those directly affected by the proposed action, through property acquisition, relocation, noise, and other impacts, generally reflect Census data for neighborhoods adjacent to the study-area freeway system. WisDOT and FHWA reviewed the Census data and conducted extensive public outreach efforts which indicated a relatively small minority or low-income population in the study area, compared to the respective the county population as a whole. WisDOT and FHWA concluded that the proposed action, regardless of which Modernization Alternative is implemented, will not have a disproportionately high and adverse impact on low income or minority communities.

3.9.3 Measures to Mitigate Adverse Socioeconomic Impacts

None identified.

3.10 Visual Character/Aesthetics

3.10.1 Affected Environment

The visual character of a transportation project accounts for both the views from the transportation corridor (views by corridor users) and the views of the corridor (views from surrounding areas).

In general, the topography of the corridor is level to gently rolling. The existing landscape and viewshed from the study-area freeway system is mostly an urban, built environment consisting of commercial, industrial, institutional, recreational, natural, utility, and residential land uses. Bridges and the associated approaches offer longer views of the surrounding landscape. Residential features are typically filtered by vegetation or other landscape features, though some pockets of residential activity can bee seen from the highways.

Portions of the existing study-area freeway system are at grades lower than the surrounding area or are surrounded by dense vegetation, vegetated berms, steep slopes in the right-of-way, and noise mitigating walls, which limit the views from and of the corridor. Generally, views from the corridor can be characterized as short views of vegetated right-of-way filtering the surrounding landscape.

Along the southern leg, the views from and of the corridor are limited by noise walls located throughout the southern leg, and the trees and other vegetation growing along the edge of the right-of-way. Views are most limited near the Greenfield Avenue interchange and the southbound lanes of I-894 near the Lincoln Avenue interchange. The overhead electrical

transmission lines, which parallel to I-894/US 45, are a noticeable element of the viewshed when looking east. There are also views of residential areas with some commercial buildings visible in the distance.

Along the east leg, some views from and of I-94 are blocked by noise barriers. Looking to the south, east of 84th Street, travelers along the highway are able to see State Fair Park, most notably the Pettit Center and State Fair Gate. A commercial office complex is also visible to the north of I-94, west of 84th Street. The west leg provides a view of a wooded area, which houses the Milwaukee County Zoo, and light industrial companies.

The north leg of the study area provides the most varying views for study-area freeway system motorists. Traveling north from the core of the Zoo Interchange, motorists see a residential area that transitions into offices and institutional uses, with the Regional Medical Center located to the east of US 45 at the Watertown Plank Road exit. An open area and several historic buildings are notable landmarks on the east side of US 45, north of Watertown Plank Road. The viewshed through the Underwood Creek segment is restricted by earthen berms on both sides of the highway. Moving north past Underwood Creek, the visual landscape east of the roadway is commercial businesses. Between North Avenue and Center Street, the roadway sits below the surrounding land uses, with views of an embankment and trees. North of Center Street, the Wauwatosa West High School campus, warehousing, light industrial activities, and the Wauwatosa water tower are the most noticeable objects in the viewshed.

Viewers of the roadway in the study area will note that away from the core interchange, the roadway elevation is generally at or below the elevation of the surrounding land uses. However, where present, noise barriers interrupt the viewing horizon. Many residences are located across the street from noise barriers, which block the view from these residences. The many levels of the core of the Zoo Interchange dominate the viewshed in that area.

3.10.2 Aesthetic Impacts

Highways are prominent features in the landscape that can affect the visual quality of the natural and built environment; likewise, the visual quality of the adjacent natural and built environment affects highway travelers' visual experience. FHWA Technical Advisory T6640.8A provides guidance on the preparation and processing of environmental documents. It states that when potential for visual impacts exists, an environmental study should identify the impacts to the existing resource, and the relationship of the impact to potential viewers of and from the project, as well as measures to avoid, minimize, or reduce the adverse impact.

No-Build Alternative

The No-Build Alternative would not change the visual character of the study area.

Modernization Alternatives

The Modernization Alternatives would change the viewshed for some viewers of or from the study-area freeway system. Since the highway would be reconstructed on its existing alignment, these viewsheds would remain relatively the same. Each Modernization Alternative would have similar impacts on the visual environment. In some instances, the Modernization Alternatives would cause the relocation of buildings adjacent to study-area

highways. These structures provide a visual buffer between the freeway and other structures in the area, to some extent. If these structures are removed, the adjacent homes and businesses would lose their visual buffer. In other instances, the highways would be moving closer to existing structures. Thus, the Modernization Alternatives would remove some buildings and move the highways closer to other buildings, causing some change in the visual environment. Additionally, the core of the Zoo Interchange would contain bridges that are higher than the existing bridges (approximately 25 to 30 feet higher in some locations).

During construction, several temporary visual impacts would occur, such as exposed earth, construction equipment, and vegetation loss. Constructing new noise barriers and reconstructing existing barriers could eliminate views of and from the freeway in several locations. These barriers could be located closer to existing viewers of the highways, causing a change in the existing viewshed. Relocating the American Transmission Company utility corridor through the south and west legs could also result in a change in the visual environment. Please see Section 4.3.2 for additional information regarding visual impacts to the Milwaukee County Zoo. Along the south leg, it is proposed that the utility corridor be moved closer to the residences on the east side of I-894/US 45 to accommodate the new highway alignment. Currently, the preferred alignment and relocation of the American Transmission Company utility corridor along the west leg has not been finalized. If the utility corridor on this leg is moved from its present location, it could alter the viewshed for both viewers of and from the study-area freeway system

3.10.3 Measures to Mitigate Adverse Aesthetic Impacts

Future community sensitive design (CSD) efforts will further identify existing viewsheds and vistas, as well as provide concepts for visual benefits and minimization of impacts resulting from a larger-scale freeway and core interchange. Previous CSD efforts on the Marquette Interchange and I-94 North-South Corridor projects provide CSD examples and best practices to draw from for this study. For these projects, CSD committees worked to identify aesthetic treatments and beautification measures that blend the highway corridor into the surrounding environment. A CSD committee will be formed for the Zoo Interchange project.

3.11 Surface Water and Fishery

3.11.1 Affected Environment

The study-area freeway system is in the Menomonee River watershed and crosses two tributary streams to the Menomonee River. US 45 crosses over Underwood Creek, approximately 0.8 mile north of Watertown Plank Road, and I-94 crosses over Honey Creek at the 84th Street interchange and over Underwood Creek at 124th Street (see **Exhibit 3-22**).

Menomonee River Watershed

The Menomonee River watershed, part of the Milwaukee River Basin, consists of 96 miles of rivers and streams and drains 136 square miles in Milwaukee, Ozaukee, Washington, and Waukesha counties. The Menomonee River watershed includes Honey Creek and Underwood Creek; both of these streams cross study-area highways. Land cover within the watershed is primarily urban (42 percent) with significant grassland (22 percent) and agricultural (17 percent) cover (DNR, 2001).

Honey Creek originates from a storm sewer outfall at South 43rd Street in the City of Greenfield. It flows primarily in a northerly direction for a distance of approximately 8.8 miles, until joining the Menomonee River at approximately 72nd Street in the City of Wauwatosa. Honey Creek flows through portions of Greenfield, Milwaukee, West Allis, and Wauwatosa. In the Zoo Interchange study area, Honey Creek crosses under I-94 in an underground, enclosed conduit at the 84th Street interchange, running from the southeast quadrant of the interchange to the northwest quadrant. Honey Creek leaves the underground conduit and daylights in the northwest quadrant of the I-94/84th Street interchange, crossing 84th Street approximately 700 feet north of mainline I-94. A portion of Honey Creek, from I-94 in the north to Arthur Avenue in the south (approximately 2 miles), is contained in an underground concrete conduit, a section of which flows under State Fair Park via a series of three 10-feet by 15-feet box culverts. Additional channel modification to Honey Creek included deepening, straightening, and lining with concrete. Approximately 87 percent of the creek's length has been altered in an attempt to accommodate increased stream flows due to development and to provide for a stable, low-maintenance channel. The annual peak stream flow in Underwood Creek ranges from 320 to 7,500 cubic feet per second based on flows from 1975 to 2006.

Flood Control in the Menomonee River Watershed

Since 1973, the region encompassing Milwaukee County has had nine flood-related Presidential-declared disasters and two Presidential-declared emergencies. In response, MMSD initiated a comprehensive watershed-wide approach by developing a Watercourse System Management Plan for its planning area, including the Menomonee River. The Menomonee River Watercourse Management Plan consists of five main projects that are integrated and reliant on each other to function properly in managing flooding in the Lower Menomonee River. The Milwaukee County Grounds floodwater management facility is one of the Watercourse Management Plan's component projects.

The Milwaukee County Grounds floodwater management facility, under construction since 2006, will consist of a two-lobe floodwater basin designed to receive water diverted from Underwood Creek during heavy rainfall. Water will be diverted from Underwood Creek by way of a diversion structure located along the east bank of Underwood Creek, west of US 45, and then carried through a 17-foot diameter, concrete-lined tunnel that will be bored at a maximum depth of 90 feet below the surface. This tunnel will cross beneath US 45 and carry water to a tunnel stilling basin before entering the west lobe of the floodwater basin. Water entering the basin will eventually drain out through a low-level outlet and spillway structure constructed on the east lobe of the floodwater basin. This water will be conveyed through culverts beneath the Canadian Pacific Railway bridge and into the Menomonee River. A new bridge along Swan Boulevard was constructed over the open channel between the west and east lobes of the floodwater basin (MMSD, 2006a).

Much of the Honey Creek watershed (11 square miles) is highly urbanized (65 percent of the land is medium to high density residential development) with significant portions having been heavily modified to include numerous municipal stormwater conveyance systems and outfalls. These modifications, along with the lining and channelization of Honey Creek, have severely degraded its overall biological integrity and ecological function. Honey Creek is classified as a warm water forage fish community, meaning it is capable of supporting an abundant, diverse community of forage fish and other aquatic life. Currently, much of Honey Creek does not meet these goals, and there is a variance to the water quality standards for Honey Creek for both bacteria and dissolved oxygen levels. Honey Creek is also known to have a history of high bacteria levels. High bacteria concentrations have been observed along Honey Creek during dry weather, low precipitation events, and wet weather (MMSD, 2006b).

Underwood Creek is an 8-mile-long perennial stream which crosses the Zoo Interchange study area under US 45, east of Highway 100 and approximately 0.5 mile north of Swan Boulevard. The South Branch of Underwood Creek is approximately 1.1 miles long and crosses under I-94 at 124th Street, the western boundary of the study area. Based on 2020 land use conditions, future streamflows are expected to increase from 0 to 5 percent along Underwood Creek (MMSD, 2008). Much of Underwood Creek, including the entire stream within the study area, is channelized with concrete lining and has been diverted from its original course. The drainage area is relatively small (approximately 20 square miles) and is influenced by poorly draining soils which influence the amount and rate of runoff. The drainage area is mostly urbanized with the primary land use consisting of single-family residential. Stormwater runoff from lawns, rooftops, streets, driveways, parking lots, and storage areas contribute sediment, nutrients, organic matter, oil and grease, bacteria, metals, and toxic organic substances to streams.

Between 2003 and 2005, MMSD began water quality monitoring at seven sites along Underwood Creek and the south branch. This monitoring noted that conventional pollutants, including fecal *Coliform* bacteria, total phosphorus, soluble phosphorous, total Kjehldahl nitrogen, and to a lesser extent, dissolved oxygen, exceeded State of Wisconsin criteria or recommended maximums.

Toxic pollutants were also present in Underwood Creek, but at no time did the levels exceed State of Wisconsin chronic criteria. MMSD developed a water quality index used to evaluate river and creek water quality. This measurement is based on nationally recognized indices and established water quality criteria. The water quality in Underwood Creek was regularly classified as either "fair" or "bad", with 2005 providing the worst year for water quality, on average. The study also noted that the concentrations of suspended solids, log fecal coliform, copper, and zinc in Underwood Creek increased with rainfall (MMSD, 2008).

According to the Wisconsin Administrative Code, Underwood Creek is designated for a special variance use, meaning it is unable to support full warm-water fish communities. According to SEWRPC's *A Regional Natural Areas and Critical Species Habitat Protection and Management Plan for Southeastern Wisconsin* (1997), a variance designation indicates that the stream has undergone extreme cultural alteration or has severe physical limitations. In 2002, staff at UWM's Stream Ecology Laboratory conducted a fish survey within Underwood Creek. Two of the sample points were close to the existing US 45 crossing of Underwood Creek, which is approximately 0.75 mile upstream of the confluence of Underwood Creek and the Menomonee River. At sample points both 0.5 mile and 1.0 mile upstream of the confluence, six species of fish were inventoried. The most common fish species sampled at these sites included the green sunfish, bluegill, and blacknose dace.

Many streams in the watershed, including Underwood Creek and Honey Creek, have been concrete lined or straightened to convey floodwaters off the land faster, which restricts habitat for aquatic life (DNR, 2001). MMSD, as part of the *Watercourse Management System Plan*, will rehabilitate Underwood Creek from Highway 100 to its confluence with the Menomonee River by replacing the concrete-lined channel with natural banks (MMSD, 2002). The concrete-lined channel bottom of a 300-foot section, near US 45, will be replaced with stone and floodplain vegetation. The sideslopes will remain concrete-lined (MMSD, 2006a).

Underwood Creek and Honey Creek are not listed as impaired waters under Section 303(d) of the Clean Water Act. However, sections of Underwood Creek and Honey Creek contain lower amounts of dissolved oxygen than other areas in the watershed. Without sufficient oxygen in

the water, desirable species of fish and other aquatic life cannot survive. The amount of dissolved oxygen in water is one of the most important water quality indicators. Stream and wetland modification, urban and rural runoff, construction site erosion, and industrial point sources of pollution are the major contributors to degraded water and habitat quality within the watershed. Additionally, flooding is a major concern in the Menomonee River watershed.

Stormwater Collection

In the study area, the majority of runoff from the freeway system is collected by inlets and conveyed in storm sewer pipes. This storm sewer system, like most in urban areas, empties directly into streams. The north leg of the study-area freeway system drains into Underwood Creek except a small area near Burleigh Avenue that drains to the Menomonee River. The east leg drains into Honey Creek, and the south and west legs drain into the South Branch of Underwood Creek through a 96-inch storm sewer (see **Exhibit 3-22**).

3.11.2 Surface Water and Fishery Impacts

Water Quality

Water quality impacts can occur due to stormwater runoff from highways. Runoff pollution is rainwater or melting snow that washes off roads, bridges, parking lots, rooftops, and other impermeable surfaces. As it flows over these surfaces, the water picks up dirt and dust, rubber and metal deposits from tire wear, antifreeze and engine oil that has dripped onto the pavement, pesticides and fertilizers, and discarded cups, plastic bags, cigarette butts, pet waste, and other litter. These contaminants are carried into lakes, rivers, and streams and have the potential have the potential to affect water quality, vegetation, and associated aquatic life (U.S. EPA, 1995).

Water quality impacts are associated with constructing, operating, and maintaining roadways. The primary construction impact is the potential for erosion and siltation into streams. An increase in suspended sediment can reduce aquatic productivity by limiting photosynthesis, lowering oxygen levels, and covering food sources and fish spawning areas.

During normal roadway operation, these pollutants could be washed from the roadway surface by stormwater runoff to nearby water bodies. The effects of these pollutants would be greatest at locations that discharge directly to waterways. Winter maintenance includes applying deicing agents, normally salt and sand. Deicing salts can also affect water quality by increasing the chloride levels during runoff and snowmelt. Salt flows into ditches and travels to receiving waterways. Salt spray from passing vehicles drifts as a mist and deposits on vegetation and soil.

The most common deicing agent used in Wisconsin is sodium chloride, commonly referred to as road salt. According to TRB Special Report 235, *Highway Deicing: Comparing Salt and Calcium Magnesium Acetate* (1991), impacts of road salt can adversely affect roadside vegetation, streams, and groundwater, but the impacts depend on a wide range of factors. Traffic levels, wind direction, and intensity and frequency of salt application affect the extent of damage to vegetation. Threshold levels vary based on the species, temperature, light, humidity, wind, soil type, drainage patterns, precipitation, plant size, and water availability.

In general, chloride is thought to be more harmful than sodium to plants. Chloride can cause stress similar to drought conditions when it accumulates in plants. Sodium's impact can be detrimental to plant growth but is less direct. A 1990 Nevada DOT study found that the slope of

the roadside is a key factor in determining where salt reaches vegetation (Caltrans and Nevada DOT, 1990). In flat areas, the salt exposure was an average of 17 feet from the edge of pavement.

Runoff from roadways or melting snow enters the ground through ditches adjacent to the study-area freeway system. Studies have found that concentrations are highest within 5 to 10 feet of the edge of pavement, but some studies have found increased sodium and chloride levels in soil up to 30 feet from the pavement. Salt spray can deposit on leaves and branches. Road salt can enter water supplies by percolation through soil into groundwater. Upon entering fast moving streams and larger rivers, salt water concentrations are quickly diluted usually having little or no long-term effects.

Stormwater runoff from pavement is typically warmer than stream water temperature, and therefore, increased runoff can potentially raise stream temperatures. Increased stream water temperatures can impair habitat for cold-water aquatic species by lowering the amount of dissolved oxygen available and increasing the amount of biological activity, further affecting dissolved oxygen levels.

Water Quantity

The amount of stormwater runoff from highways increases proportionately to the amount of impervious surface (that is, pavement). The Modernization Alternatives would increase the amount of runoff from the roadway compared to the No-Build Alternative. In general, an increase in runoff volume can increase the velocity of the runoff thus increasing the potential for erosion and increased sediment (Bent et al., 2001).

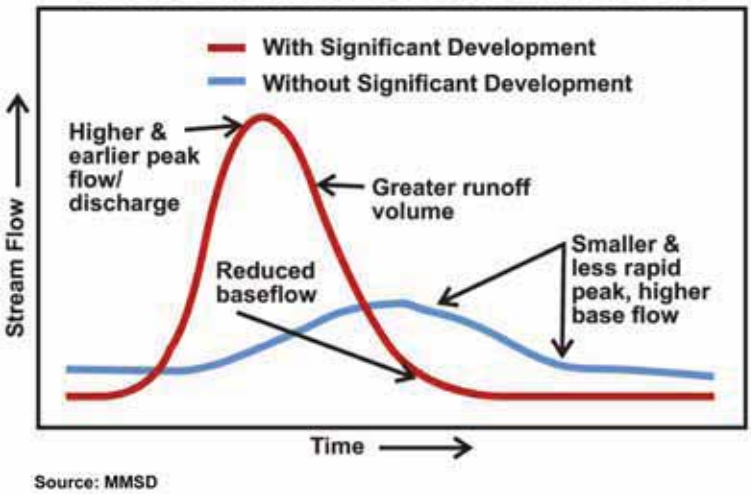
The amount of stormwater that runs off the study-area freeway system is an important consideration. Runoff from roadways can increase the amount of water in area streams above normally carried capacities. MMSD prepared the following primer on runoff in urban areas from buildings, parking lots, and roads:

> In areas with low levels of development, depending on soil conditions, as much as 50 percent of rainfall can be absorbed directly into the ground, with only about 10 percent of this water running off the land. In contrast, where the land has been extensively developed as in highly urbanized areas, very little water is absorbed into the ground. Instead, more than half of the water runs off the land because of hard impervious surfaces like buildings, streets, and parking lots.
>
> These increases in runoff volumes from highly developed areas often contribute to frequent and more severe flooding problems. Additionally, this runoff also picks up a variety of pollutants from the surrounding landscape and carries it to the stream. Even small storms in highly developed areas can produce dramatic "pulses" of high flows and pollutant loads. Because these high flow pulses occur on a more or less regular basis, they can lead to stream channel erosion, bank instability, pollutant-related toxicity to aquatic organisms and washout of aquatic organisms that live in the stream upon which fish feed.
>
> While there are environmental consequences to high flows during wet periods, there are equally as stressful conditions of lower flow and higher water temperature extremes during dry periods. This occurs because rainfall sheds off the land too quickly in urbanized areas, not allowing rainwater time to replenish the groundwater flow to the stream in a slow, sustainable manner. This reduction of baseflow, the drying of streams

and streambeds, prevents the formation of diverse aquatic life communities and healthy fish populations (MMSD, 2004).

Exhibit 3-23 illustrates the relationship between impervious area and stream flow.

EXHIBIT 3-23
Relationship Between Impervious Area and Stream Flow



In response to the potential impacts of increased stormwater runoff, WisDOT and FHWA are evaluating several best management practices to minimize the amount of runoff that enters water bodies, reduce the flow's velocity, and improve the water quality of the runoff (that is, remove sediment and pollutants). See Section 3.11.3, Measures to Mitigate Adverse Effects.

The WisDOT/DNR Cooperative Agreement contains a Memorandum of Understanding regarding stormwater discharges to waters of the state. This Memorandum of Understanding requires WisDOT to implement a stormwater management program for its projects that is consistent with Section 402(p) of the Clean Water Act, Chapter 283 of the State Statutes, and Chapter NR 216 Wisconsin Administrative Code.

Wisconsin Administrative Code Chapter TRANS 401 outlines stormwater management and erosion control procedures for WisDOT projects. As applied to this project, this rule requires removal of 40 percent of total suspended solids for the study area, buffer areas upstream of waterways and wetland, and maintaining the 2-year peak discharge rate to the maximum extent practicable.

No-Build Alternative

Under the No-Build Alternative, stormwater would continue to drain off the existing pavement and enter area waterways and ditches. Water that drains off bridges would fall directly into waterways below. Few areas of the study-area freeway system would have treatment techniques to remove suspended solids from stormwater runoff. Less stormwater would drain off the study-area freeway system into Underwood Creek and Honey Creek under this alternative, compared to the Modernization Alternatives, but the level of pollutants would be higher.

Modernization Alternatives

No new water crossings would be required as a result of the Modernization Alternatives. All of the Modernization Alternatives would increase the amount of impervious pavement surface that currently exists within the freeway system. The amount of new pavement will vary depending upon the alternative and sub-alternative selected. On the north leg, the amount of

pavement will increase approximately 30 to 33 percent from the existing condition. On the east leg, the amount of pavement will increase by approximately 38 to 50 percent. For the south leg and west legs, the Modernization Alternatives would increase the amount of pavement present by about 30 percent and 45 percent, respectively, from the existing condition.

MMSD has expressed concern over an increase in the volume of stormwater runoff from the study-area freeway system; noting that increased runoff could increase the likelihood of downstream flooding. MMSD sized its floodwater management basins at the Milwaukee County Grounds assuming the study-area freeway system's impervious area would not expand (MMSD, 2008). The City of West Allis has also expressed concern about Underwood Creek's ability to handle additional runoff (see Appendix D, page D-53).

3.11.3 Measures to Mitigate Adverse Surface Water and Fishery Impacts

WisDOT would implement stormwater management techniques for the Modernization Alternatives. The Modernization Alternatives will increase impervious area and therefore increase the amount of stormwater runoff from the study-area freeway system. However, these alternatives will also provide the opportunity to implement best management practices (BMPs) to treat the runoff and bring the study-area freeway system in compliance with Wisconsin's stormwater management regulations that limit the amount of pollution in runoff.

Stormwater treatment measures will be evaluated during the project's design phase. BMPs can be utilized for stormwater management. BMP options include the following:

- Retention Basins (Wet Detention Basins)—Retention basins have a permanent pool of water year-round. The permanent pool allows pollutant particles in stormwater runoff to settle out over an extended period of time. Nutrient uptake also occurs through increased biological activity.
- Dry Detention Basins—A dry detention basin is typically designed to store runoff and discharge it slowly to reduce the peak discharge downstream. As normally designed, these basins typically have little effect on the volume of stormwater released to the receiving water. The peak flow reduction is often accomplished through use of a multistage outlet structure that allows increased discharge as water levels in the basin increase.
- Infiltration Devices—Infiltration can be achieved through use of trenches or grass swales. Infiltration devices are used to slow down water flow so that more water is absorbed into the ground and more pollutants are removed from runoff.
- Grass Ditches—This BMP generally helps reduce suspended solids to meet the regulatory goal of TRANS 401, which outlines stormwater management and erosion control procedures for WisDOT projects.
- Trapezoidal Swale through Infield—This BMP combines grass ditch treatment with peak flow reduction and is considered the same level of suspended solid control as grass ditches.
- Vegetated Rock Filters—This BMP may be used at outfalls to waterways or anywhere concentrated runoff leaves the right of way. It is similar in concept to a level spreader which attempts to reintroduce sheet flow and also provides a small amount of peak flow and volume reduction.

- Swale Blocks/Ditch Checks—These are small earthen berms constructed in the bottom of a ditch at regular intervals to detain runoff from frequent storms. This BMP provides peak flow reduction and may provide infiltration benefits depending on soil conditions.
- In-line Storage—This method is not desirable from a water quality standpoint, but would manage water quantity. Storm sewer pipes would be designed larger than normal to provide storage in the sewer during rain events, then the water is gradually released after the rain event ends.

To comply with State Statute 87.30 and NR 216[4] and to address concerns raised by MMSD and the City of West Allis, WisDOT and FHWA are also investigating retention/detention basins to manage stormwater from the proposed improvements. The retention/detention ponds would also improve water quality by allowing solid pollutants (sand, grit, etc.) to settle out of the water before it flows into storm sewers or streams. If these retention/detention ponds are built, WisDOT will provide landscaping around the pond. Potential locations for retention/detention basins include:

- West Leg—Along the Underwood Creek Parkway south of I-94. Stormwater runoff from the south and west legs would be stored at this location. The Oak Leaf Trail is routed along a little-used roadway that currently occupies the potential pond location. WisDOT would remove the roadway and relocate the Oak Leaf Trail to a location suitable to the Milwaukee County Parks Department if a pond were built at this location.
- East Leg—In the northwest quadrant of the I-94/84th Street interchange. A retention/detention basin in this location may require relocating the Honey Creek stream bed further east of its current location. The basin would provide storage for stormwater runoff from the east leg of the study-area freeway system. Some adjacent residents oppose a pond at this location.

  DNR has encouraged WisDOT to consider Honey Creek channel improvements downstream of I-94 in lieu of a retention/detention basin. The channel improvements could include removing the concrete lining and providing a wider channel. WisDOT will work with DNR, MMSD, and local governments to investigate this option. Unlike the west, north, and south legs, the east leg does not have enough available open space to build a properly sized retention/detention pond without acquiring and removing buildings.
- North Leg—In the northeast quadrant of the US 45/Watertown Plank Road interchange. The basin would collect stormwater runoff from US 45, between the Zoo Interchange and Swan Boulevard. North of Underwood Creek to an area approximately 900 feet south of Burleigh Street, stormwater runoff would continue to flow through the freeway storm sewer system, into Wauwatosa storm sewers, and discharge to Underwood Creek.
- Core—Reconfiguration of the core of the Zoo Interchange may make space available for one or more small ponds. The core drains into Honey Creek, so ponds in the core would reduce the need for a pond at 84th Street.

After a preferred alternative for the Zoo interchange is chosen, WisDOT will assess the different water quality and water quantity management options during the design phase.

[4] NR 216 says that WisDOT bridge "construction may not cause any obstruction to flood flows."

The Section 404 permit process, which will occur after the stormwater management plan is developed, will provide an opportunity for public input on the issue of a retention/detention pond at 84th Street. A pond at this location would require re-aligning Honey Creek, which would be subject to the Section 404 permit process.

No fishery mitigation measures have been identified.

3.12 Environmental Corridors and Natural Areas

3.12.1 Affected Environment

As defined by SEWRPC, environmental corridors are areas in the landscape containing especially high-value natural, scenic, historic, scientific, and recreational features. In southeastern Wisconsin, they generally lie along major stream valleys, around major lakes, and in the Kettle Moraine area. These features occur in an essentially linear pattern of relatively narrow, elongated areas.

Primary environmental corridors include a variety of important natural resource and resource-related elements and are at least 400 acres in size, 2 miles long, and 200 feet wide. The primary environmental corridors include some of the best remaining woodlands, wetlands, and wildlife habitat areas in the study area. These corridors have great environmental and recreational value. Their preservation in an essentially open, natural state will serve to maintain a high level of environmental quality in some segments of the study area.

In the Zoo Interchange study area, primary environmental corridors are located along both Underwood Creek and Honey Creek. The primary environmental corridor along Underwood Creek crosses the study area in two locations: under I-94 at 124th Street, and under US 45 north of Watertown Plank Road. The Underwood Creek primary environmental corridor includes the DNR's Forestry Science Center. A primary environmental corridor follows Honey Creek from I-94 north to its confluence with the Menomonee River **(Exhibit 3-22)**.

Secondary environmental corridors contain substantial, but smaller, concentrations of natural resources and generally connect with the primary environmental corridors. Secondary environmental corridors are at least 100 acres in size and 1 mile long. There are no secondary environmental corridors in the study area.

Smaller concentrations of natural resource base elements that are separated physically from the environmental corridors by intensive urban or agricultural land uses are also important. These areas, which are at least 5 acres and 200 feet wide, are isolated natural resource areas. The isolated natural areas in the study area include portions of the Milwaukee County Zoo, Wisconsin Avenue Park, and an area 650 feet west of I-894 and north of Lincoln Avenue.

There is one designated state natural area located near the study corridor. Natural areas are classified on the basis of a system developed by the DNR. According to the *Park and Open Space Plan for the City of Wauwatosa* (SEWRPC, 1998), Wil-O-Way Woods, located just east of US 45 between Swan Boulevard and Underwood Creek Parkway, is considered a natural area of local significance. This area is now the location of DNR's Forestry Science Center. It is defined as a natural area that has been substantially altered by human activity, but provides refuge for native plant and animal species that no longer exist in the surrounding area, due

to disruptive land uses and associated activities. The 41-acre Wil-O-Way Woods is considered to be a moderate-quality, southern dry-mesic hardwood forest, containing a representative ground flora.

Milwaukee County is designated as a Coastal Area by Wisconsin's Coastal Zone Management Program; however, there are no special coastal areas located in the study area. Based on WisDOT's review and coordination with the Coastal Management Program, the project appears to be consistent with the Coastal Management Program's goals.

3.12.2 Environmental Corridor and Natural Area Impacts

No-Build Alternative

Under the No-Build Alternative, no environmental corridors or natural areas would be affected.

Modernization Alternatives

The Modernization Alternatives would impact primary environmental corridors on the north and west legs of the Zoo Interchange study area.

The Underwood Creek primary environmental corridor would experience similar impacts from the 6-lane N1 and N3 Alternatives and 8-lane N1 and N3 Alternatives. Reconstructing the US 45 bridge over Underwood Creek Parkway would require construction of new bridge piers within this primary environmental corridor. Currently, 1.8 acres of WisDOT right-of-way is classified as primary environmental corridor on the north leg. The 6-lane Modernization Alternatives would impact an additional 0.4 acre of primary environmental corridor on the north leg, while the 8-lane Modernization Alternatives would impact an additional 0.7 acre. The area impacted consists mainly of small upland trees and bushes along the concrete-lined portion of Underwood Creek.

On the west leg, the bridge carrying I-94 over Underwood Creek and the associated primary environmental corridor will be replaced. The new bridge will be slightly wider, but it will span over the primary environmental corridor, affecting 0.1 acre.

3.12.3 Measures to Mitigate Adverse Environmental Corridor and Natural Area Impacts

All primary environmental corridors are also Milwaukee County parkland. Mitigation measures are discussed in Section 3.26.3.

3.13 Floodplains and Hydraulics

3.13.1 Affected Environment

Floodplains provide flood and stormwater attenuation by decreasing water velocities and temporarily storing flood water thus also removing nutrients and providing erosion control. Floodplain also carries regional flood discharges and provides wildlife habitat and corridors for wildlife movement. These functions vary among locations depending upon vegetative cover, waterway hydrology, and distance from the waterway. The freeway mainline crosses the

100-year floodplain associated with Underwood Creek on the north leg along US 45. On the west leg, I-94 crosses over the 100-year floodplain associated with the south branch of Underwood Creek near 124th Street. The bridge carrying I-94 over the floodplain will be replaced.

One location in the study area has a 100-year floodplain that does not cross freeway mainline, but does border an interchange ramp. This occurs on the east leg in the northwest quadrant of the 84th Street interchange, where the Honey Creek floodplain abuts the entrance ramp to westbound I-94.

3.13.2 Floodplain Impacts

Executive Order 11988 on Floodplain Management and 23 CFR 650, Subpart A, directs federal agencies to take action to reduce the risk of flood loss; minimize the impacts of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains. The executive order also requires agencies to elevate structures above the flood base whenever possible. The objective of the order is to avoid the long- and short-term adverse impacts associated with the occupancy and modification of floodplain, and to avoid direct and indirect support of floodplain development where ever practical. (See Section 3.2.2 for floodplain cumulative impact discussion.)

Through the WisDOT-DNR Cooperative Agreement, WisDOT is required to determine the impact of new or modified bridges, box culverts on the 100-year flood elevation (WisDOT and DNR, 1993). A hydraulic analysis of both existing and proposed conditions is conducted to determine if the bridge or culvert causes a change in the 100-year flood elevation. Property owners, local zoning authorities, and the DNR are notified if the flood elevation increases by more than 0.01 foot. It should be noted that minor lengthening of most box culverts often do not require a hydraulic analysis unless there are known deficiencies in hydraulic capacity.

WisDOT is required to assist affected municipalities in updating floodplain information in their zoning ordinance for submittal to the Federal Emergency Management Agency, if requested. WisDOT provides the results of the analysis, the hydraulic models developed, mapping, and other exhibits developed in the course of the analysis.

No-Build Alternative

The No-Build Alternative would not affect floodplain.

Modernization Alternatives

All Modernization Alternatives would result in roughly 0.1 to 0.2 acre of fill being placed in the 100-year floodplain. On the north leg, the 6-lane Modernization Alternatives would fill 0.1 acre of floodplain along Underwood Creek. The 8-lane Modernization Alternatives would require 0.2 acre of floodplain associated with Underwood Creek to be filled.

Bridge replacements at the Underwood Creek crossing locations would involve mainline crossings of the 100-year floodplain. All bridges would be sized to pass a 100-year flood without interruption to traffic due to flood damage to the roadway or structures and would not increase headwater elevations by more than 0.01 foot. The floodplain structures would not interrupt or terminate a transportation route needed for emergency vehicles or routes that

serve as an area's only evacuation route. All floodplain crossings would be constructed in accordance with the WisDOT-DNR Cooperative Agreement.

As noted, one of the intents of Executive Order 11988 is to avoid direct and indirect support of development within existing floodplains. According to the executive order, an action supports floodplain development if it encourages, allows, serves or otherwise facilitates additional floodplain development. Although the project would directly affect the floodplain, it would not support development in the Underwood Creek floodplain because this area is publicly owned and will remain so.

3.13.3 Measures to Mitigate Adverse Floodplain Impacts

All structures would have adequate capacity for 100-year flood flow without public or emergency vehicle interruption from damage to the roadway or structures and would not increase headwater elevations by more than 0.01 foot. None of the floodplain crossings would cause a substantial potential for interruption or termination of a transportation facility needed for emergency vehicles or the community's only evacuation route. Crossings would be consistent with local floodplain management goals and objectives. Additionally, floodplain crossings will be designed to not make the existing flood profile worse for adjacent landowners.

3.14 Groundwater and Water Supply

3.14.1 Affected Environment

Groundwater sustains lake levels, provides the base flows for regional streams, and comprises a major source of water supply for domestic, municipal, and industrial users. Like surface water, groundwater is susceptible to depletion in quantity and to deterioration in quality. Lake Michigan is the source of drinking water in the study area. Milwaukee Water Works provides water to the cities of Milwaukee, Wauwatosa, and West Allis (see Section 3.4, Utilities).

According to U.S. EPA's list of Designated Sole-Source Aquifers, there are no sole-source aquifers in Wisconsin as defined by Section 11424(e) of the Safe Drinking Water Act (U.S. EPA, 2004).

Road salt (sodium chloride) is applied to the study-area freeway system during winter weather conditions. WisDOT contracts with Milwaukee County to clear the study-area freeway system of snow and ice. WisDOT set guidelines on when and how much salt is applied to roads in winter. Milwaukee County submits records indicating the type and amount of deicer used for each application. Salt storage sites must have an impermeable base and cover, as well as a holding basin to contain runoff. These requirements help minimize the impact to groundwater from storage facilities.

The Milwaukee County Zoo has a high-capacity well in the northwest quadrant of the Zoo Interchange. The well is used to keep Lake Evinrude and smaller ponds on the zoo grounds at full elevation. WisDOT and FHWA are not aware of any other wells in the study area.

3.14.2 Groundwater and Water Supply Impacts

No-Build Alternative

The No-Build Alternative would not affect groundwater or drinking water supply.

Modernization Alternatives

The Modernization Alternatives are not expected to adversely affect drinking water supply or localized groundwater at or near the surface.

Since sizable dewatering or depressurizing activities are not anticipated during construction, temporary impacts on the groundwater system are not expected or would be minimal in isolated locations such as creeks/stream beds and other low lying areas. No noteworthy changes in chemical characteristics of the surface material are anticipated and no degradation of water quality entering the aquifer is expected.

The zoo's well would not be directly affected. Electrical transmission towers may be moved close to the well head.

3.14.3 Measures to Mitigate Adverse Groundwater and Water Supply Impacts

See Section 3.27.4, Water Quality/Erosion. WisDOT and FHWA will ensure that access to and maintenance of the county zoo's well head is not adversely affected.

3.15 Wetlands

The Corps' Wetland Delineation Manual (1987) defines wetlands as "areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions." According to the 1987 manual, in order to be considered a jurisdictional wetland, three criteria must be met: (1) a prevalence of hydrophytic vegetation, (2) the presence of hydric soils, and (3) wetland hydrology.

3.15.1 Affected Environment

WisDOT made a preliminary determination of wetland boundaries in June and July 2007. Wetland determinations and boundaries were estimated based on vegetation, topography, and obvious wetland hydrology field indicators. Once identified, the wetlands were then grouped by wetland classification. Preliminary wetland investigations identified 17 wetlands, totaling 7.1 acres, adjacent to the study-area freeway system (**Table 3-15**). **Exhibit 3-24** illustrates the wetlands.

On the north leg, there are nine wetlands, two of which are associated with Underwood Creek and are within the primary environmental corridor. The remaining seven wetlands consist primarily of depressional or disturbed, isolated wetlands. On the east leg, there is one depressional wetland that is associated with a stormwater pond at the Honey Creek Corporate Center. On the south leg, there are two isolated wetlands; one is associated with a roadside ditch, and the other is a small seep wetland on the roadside slope. On the west leg, there are six wetlands that consist primarily of roadside ditches or disturbed isolated wetlands.

U.S. EPA, in cooperation with the Corps, has implemented an advanced identification (ADID) program to define if wetlands and other waters are generally suitable or not suitable for discharge of dredged or fill material. In southeastern Wisconsin, advanced identification of such wetlands was undertaken in consultation with SEWRPC and DNR to support objectives of the area-wide water quality management plan that seeks to preserve high-value aquatic areas by redirecting development outside primary environmental corridors. Discharging dredged or fill material into wetlands and other waters located in primary environmental corridors is generally considered not in conformance with the Clean Water Act's Section 404(b)(1) guidelines. The two wetlands in the Underwood Creek primary environmental corridor are ADID wetlands.

TABLE 3-15
Wetland Summary

Wetland Identifier (see Exhibit 3-24)	Size	Comments
W-1	1.2 acres	W-1 is a shallow marsh with a meadow fringe. The wetland is connected to a ditch that was likely created to drain the wetland. However, the ditch shows evidence of wetland characteristics. This wetland is likely isolated from navigable waterways.
W-2	0.06 acre	W-2 is a small seep wetland on a roadside slope. Stormwater is likely directed to this wetland. This wetland is isolated from navigable waterways.
W-3	0.2 acre	This depressional wetland is sustained by stormwater from the large parking lot to the north. The wetland is isolated from navigable waterways.
W-5	0.04 acre	W-5 is a depressional wetland that is sustained by stormwater runoff from the parking lot to the south and from the adjacent roads. It is connected to W-6 by a culvert and is isolated from navigable waterways.
W-6	0.05 acre	W-6 is depressional wetland that is sustained by stormwater run-off from the parking lot to the south and from the adjacent roads. It is connected to W-5 by a culvert and is isolated from navigable waterways.
W-7	0.42 acre	This shallow marsh wetland extends outside the study area to the east. The wetland is connected to the roadside ditch which also contains wetland characteristics. The wetland is likely isolated from navigable waterways.
W-9	0.8 acre	W-9 is a depressional wetland that is isolated from navigable waterways. It extends outside the study area to the east.
W-11	0.2 acre	W-11 is a shallow marsh fringe of a stormwater pond. Because the wetland is part of a pond that was likely constructed as a stormwater management feature, it is likely not under Corps jurisdiction.
W-12	0.2 acre	This wetland is located within a ditch located in a mapped hydric soil unit. The wetland receives stormwater from the roadside ditch and drains into an unnamed tributary to the west. The navigability of the unnamed tributary is unknown, so it is unknown if W-12 is isolated or connected to navigable waters.
W-13	0.2 acre	This wetland receives water from an unnamed tributary and roadside ditches. The stream dissipates in the wetland. The origin of the unnamed tributary is unknown, so it is unknown if W-12 is isolated or connected to navigable waters. However, it appears that the unnamed tributary ceases to exist within this wetland, so it is unlikely that this wetland is not isolated.
W-14	0.2 acre	This cattail marsh is located at the base of a roadside ditch and collects water from the adjacent roads. This wetland is isolated from navigable waterways.

TABLE 3-15
Wetland Summary

Wetland Identifier (see Exhibit 3-24)	Size	Comments
W-15	0.8 acre	W-15 is a depressional wetland that receives water from a ditch and from overland runoff. This wetland is likely isolated from navigable waterways.
W-16	0.6 acre	W-16 is located at the end of two converging ditches. The shallow marsh is supported by hydrology from these ditches. The ditches are included as wetland to a point where the evidence of hydrophytic vegetation ceases. This wetland is likely isolated from navigable waterways.
W-17	1.6 acres	This depressional wetland is located in a bottomland forest along a former railroad corridor. The width of the lowland is greater than 30 feet and contains characteristics of wetland. The wetland is likely isolated from navigable waterways.
W-18	0.5 acre	W-18 is a depressional wetland that includes the ditch for this ramp. The wetland is isolated from navigable waterways.
W-19 and W-20		Outside area of effect.

All 17 wetlands in the project corridor are characterized as degraded due to the presence of non-native species or other prior disturbances that diminished wetland functions and values. However, only the floristic component was considered during the wetland investigation, and the degraded modifier could be eliminated if the majority of wetland attributes, functions, or values are found to be higher quality during the final delineation. Floristic quality is one indicator of quality but alone does not determine a wetland's function and value. For instance, degraded wetlands do provide wildlife habitat.

Wetland Classifications

The *Wisconsin Department of Transportation Wetland Mitigation Banking Technical Guideline* (WisDOT, 2002) was used to classify wetlands in the Zoo Interchange study area. Wetlands identified within the project corridor are shallow marsh (SM), wet meadow (M), shrub swamp (SS), and wooded swamp (WS). Many of the wetlands include more than one wetland type. The descriptions of each classification for wetlands that would potentially be impacted within the project corridor are as follows:

Shallow Marsh (SM). Shallow marshes form in saturated or inundated soils and are characterized by seasonal standing water. Soils in shallow marshes are usually saturated during the growing season and often inundated with 6 inches or more of water. Shallow marshes in Wisconsin are typically found in shallow lake basins or sloughs, on the border of deep marshes on the landward side, in seep areas near irrigated lands, and in areas where water collects due to drainage off roadways, ditches, and other depressional areas.

Wet Meadow (M). Wet meadows commonly occur in poorly drained areas such as shallow lake basins and the land between shallow marshes and upland areas. These wetlands often occur in areas where farming is prevalent, leading historically to their draining and filling for agricultural uses.

Wet meadows are typically drier than other Wisconsin wetland types except during periods of seasonal high water. For most of the year, they do not contain standing water, though the high water table allows the soil to remain saturated.

Shrub Swamp (SS). Shrub swamps, are similar to forested swamps. Shrub swamps are found along slow moving streams and in floodplains. Forested and shrub swamps are often found adjacent to one another, reflecting the change in topography, hydrology, and past disturbances including timber removal. Soils in shrub swamps are often saturated throughout much of the year, and sometimes inundated by as much as a few feet of water.

Wooded Swamp (WS). Forested swamps are often inundated with floodwater from nearby rivers and streams. Sometimes, they are covered by several feet of very slowly moving or standing water. In very dry years, they may represent the only shallow water for miles and their presence is critical to the survival of wetland-dependent species.

Some of the primary functions of wooded swamps include stormwater and floodwater retention, as well as wildlife habitat for a variety of upland and wetland-dependent species.

Wetland Functions

Wetlands provide functions and values depending on their position in the landscape and proximity to other plant communities, wildlife and their habitats, and the built environment. A variety of wetland functions and values are typically assessed in accepted methodologies, including the procedures described in the Highway Methodology Workbook supplement (Corps, 1999) and the Rapid Assessment Methodology forms (DNR, 2004). Wetland functions identified by these methods include floral diversity, wildlife habitat, fishery habitat, flood/stormwater attenuation, water quality protection, shoreline protection, groundwater, and aesthetics/recreation/education.

Estimating the significance of wetland functions and values is subjective and can rank from low to exceptional based on the ability of the wetland to provide the function and value being assessed. All of the wetlands within the project corridor were characterized as degraded, which indicates that while they still fulfill a wetland function or value, they may not function at an optimal level due to such factors as prior disturbance, presence of non-native species, or proximity to some external factor (roads, railroad tracks, etc.). The preliminary wetland investigation indicated a wide distribution of non-native species and the prevalence of many of those species along plant community edges or disturbed areas. Although the functions and values of wetlands within the project corridor were not assessed on an individual basis as part of the preliminary investigation, their position in the landscape and proximity to the existing roadway corridor suggests that they improve water quality by removing sediment and nutrients and provide flood attenuation by storing water and slowing runoff velocity.

3.15.2 Wetland Impacts

No-Build Alternative

No wetlands would be affected under the No-Build Alternative.

Modernization Alternatives

The Modernization Alternatives would affect wetlands as a result of reconstructing the study-area freeway system. Wetland impacts of the 6-lane and the 8-lane Modernization Alternatives are generally the same in terms of location and quantity. Most of the affected wetlands are degraded shallow marsh or degraded wet meadow. **Table 3-16** provides a breakdown of wetland impacts by alternative.

TABLE 3-16
Wetland Impacts

Alternatives		Wetland Impact
N1 w/ North Ave. single loop interchange	6-lane	0.3 acre (W7, shallow marsh)
	8-lane	0.4 acre (W7, shallow marsh)
N1 w/ North Ave. double loop interchange	6-lane	0.9 acre (W7, shallow marsh and W18, wet meadow)
	8-lane	0.9 acre (W7, shallow marsh and W18, wet meadow)
N3 w/ North Ave. single loop interchange	6-lane	0.4 acre (W3, W5, W7 all shallow marsh)
	8-lane	0.4 acre (W3, W5, W7 all shallow marsh)
N3 w/ North Ave. double loop interchange	6-lane	0.9 acre (W3, W5, W7 all shallow marsh and W18, wet meadow)
	8-lane	0.9 acre (W3, W5, W7 all shallow marsh and W18, wet meadow)
E1	6-lane	No impact
	8-lane	No impact
E1 w/ combined service drive	6-lane	No impact
	8-lane	No impact
E1/E3 Hybrid	6-lane	0.1 acre (W11, shallow marsh)
	8-lane	0.1 acre (W11, shallow marsh)
S2	6-lane	<.01 acre (W2, shallow marsh)
	8-lane	<.01 acre (W2, shallow marsh)
W3	6-lane	0.7 acre (W13, wet meadow/shrub swamp and W16, shallow marsh)
	8-lane	0.7 acre (W13, wet meadow/shrub swamp and W16, shallow marsh)

No ADID wetlands would be affected by the Modernization Alternatives.

3.15.3 Measures to Mitigate Adverse Wetland Impacts

Presidential Executive Order 11990, Protection of Wetlands, requires federal agencies to avoid, to the extent practicable, long- and short-term adverse impacts associated with the destruction or modification of wetlands. More specifically, the order directs federal agencies to avoid new construction in wetlands unless there is no practicable alternative. The order states that where wetlands cannot be avoided, the proposed action must include all practicable measures to minimize harm to wetlands.

The Clean Water Act's Section 404(b)1 Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 CFR Part 230) are administered by U.S. EPA and the Corps. The guidelines state that dredged or fill material should not be discharged into aquatic ecosystems (including wetlands), unless it can be demonstrated that there are no practicable alternatives to such discharge; that such discharge will not have unacceptable adverse impacts; and that all practicable measures to mitigate adverse effects are undertaken.

Measures to Minimize Harm

In accordance with state and federal agency policies and regulations for wetland preservation, including the Section 404(b)(1) Guidelines for Specifications of Disposal Sites for Dredged or Fill Material (40 CFR part 320), the following sections summarize wetland mitigation strategies for the Zoo Interchange study.

Avoid and Minimize Wetland Impacts. Because wetlands are scattered along all legs of the study-area freeway system, including in the ditches that drain the freeway, it is not possible to avoid wetland impacts completely during freeway reconstruction.

Of the 17 wetlands identified within the project corridor, the Modernization Alternatives would avoid impacts to ten wetlands, totaling more than 5 acres. Two of these avoided wetlands lie within the primary environmental corridor and, as a result, are ADID wetlands. These wetlands are located in the Underwood Creek Parkway and are located along Underwood Creek. Efforts to avoid and minimize impacts to ADID wetlands are given strong consideration because of the functions they perform due to their geographic position in the landscape. For example, a wetland within the primary environmental corridor can be degraded floristically, but still be considered an ADID wetland due to the function it provides at that location, such as providing flood storage adjacent to a river.

WisDOT will investigate additional measures to minimize wetland impacts such as keeping roadway side slopes as steep as practicable; disposing of excavated material on new roadway side slopes or in upland areas; minimizing sedimentation and siltation into adjacent wetlands by using strict erosion control measures; and using detention ponds, where allowed, to reduce pollutant loading and protect cold-water streams from sedimentation. Specifically, WisDOT will consider the following avoidance and minimization measures:

- Wetland 2: It may be possible to fence the wetland to avoid impacts to it.
- Wetlands 3 and 5: These small wetlands fed by runoff from a park-and-ride lot may be avoided by Alternative N1.
- Wetland 7: Steeper side slopes may minimize the impact, but this 0.4-acre wetland may be completely filled under both N1 and N3.
- Wetland 13: Steeper side slopes to minimize the impact.
- Wetland 16: Steeper side slopes to minimize the impact.
- Wetland 18: Steeper side slopes and specifications in construction contract to prohibit contractor from going into the wetland.

Wetland Compensation. Compensation for unavoidable wetland loss will be carried out in accordance with WisDOT's *Wetland Mitigation Banking Technical Guideline* developed as part

of the WisDOT-DNR Cooperative Agreement on Compensatory Wetland Mitigation. A wetland mitigation plan will be developed during the project's design phase, in consultation with state and federal agencies.

WisDOT developed the guideline in 1993 and updated it in 1997 and 2002 in cooperation with DNR, the Corps, U.S. EPA, U.S. Fish and Wildlife Service, and FHWA. Through the guideline, these agencies established a statewide policy regarding the sequence of activities required for WisDOT to compensate for wetland losses. Specifically, the guideline states "preference should be given for compensatory mitigation accomplished in the vicinity of the impacted area (onsite). Where such opportunities are not present or practical, in-watershed (near-site) opportunities should be explored."

For those cases in which onsite or near-site opportunities for wetland mitigation are not available, WisDOT can debit the wetland loss at the closest established wetland mitigation bank. Since the time at which the guideline was developed, onsite has been typically interpreted as being within 0.25 mile of the wetland impact, while near-site has been interpreted as within 2.5 miles of the wetland impact area. Therefore, a mitigation site search for a linear corridor, such as the I-94, I-894, and USH 45 corridors, would encompass a 0.5-mile corridor centered on the highway and expand to a 5-mile corridor if onsite opportunities were not available.

The guideline provides ratios for wetland replacement versus wetland loss depending on where the mitigation is to be provided. The replacement ratios increase with the mitigation site's distance from the impacted wetland.

WisDOT has an established statewide wetland mitigation bank located in Walworth County that has remaining acreage available for credit. Debiting wetland acreage credits from this bank to mitigate for the wetland losses from the Zoo Interchange project would be in accordance with the terms of the guideline.

3.16 Upland Habitat and Woodland

3.16.1 Affected Environment

Upland habitat occurs in environmental corridors, isolated natural areas, and other tracts of land that have forested or grassland cover. Although most of the land adjacent to I-94 is developed, there is some upland habitat and wooded areas in a few areas within the project area, especially in the vicinity of the Milwaukee County Grounds along Underwood Creek Parkway, Honey Creek Parkway, HAST, We Energies transmission line corridor and the Milwaukee County Zoo. Woodlands have important direct values as wildlife habitat and outdoor recreation. Woodlands also have indirect values for reducing soil erosion and stream sedimentation, reducing runoff, maintaining water tables, streams, and lake levels, and promoting groundwater recharge. Underwood Creek Parkway and Honey Creek Parkway are classified as primary environmental corridor. (See Section 3.12, Environmental Corridors and Natural Areas for more information.)

No land in the Zoo Interchange study area is enrolled in Wisconsin's Managed Forest Law program.

3.16.2 Upland Habitat and Woodland Impacts

No-Build Alternative

The No-Build Alternative would not affect upland habitat or woodland.

Modernization Alternatives

Under the Modernization Alternatives, upland habitat would be acquired in four areas. On the north leg, upland habitat is located along the east side of US 45 between Highway 100 and Watertown Plank Road, including the Underwood Creek Parkway area. Modernization Alternative N1 would acquire approximately 8.4 acres of upland habitat while Modernization Alternative N3 would acquire 4.8 acres. The difference between the alternatives stems from the connector road between Watertown Plank Road and Swan Boulevard being further to the east, and thus, further away from mainline US 45 under Modernization Alternative N1.

Along the south leg, a swath of upland habitat is located along the We Energies transmission line corridor on the east side of I-894/US 45 between Lincoln Avenue and Schlinger Avenue. Modernization Alternative S2 would acquire approximately 6.9 acres of upland habitat in this area, most of which is utility right-of-way with no trees. On the west leg, upland habitat is located south of I-94 between 116th Street and the west end of the Zoo maintenance area. Modernization Alternative W3 would acquire approximately 8.7 acres in this area, mostly as a result of new right-of-way acquired for the Highway 100 interchange. In the Zoo Interchange core, approximately 14.7 acres of upland habitat would be acquired in the northwest quadrant of the interchange, most of which utility right-of-way with no trees.

Because improvements would occur adjacent to the highway, upland impacts are strip or "edge takings." New woodland edges created by highway right-of-way may experience tree loss from the drying effects of wind, sun, and exposure to road runoff. Additionally, the Underwood Creek crossing will have room for wildlife to cross under the freeway adjacent to the stream.

3.16.3 Measures to Mitigate Adverse Upland Habitat and Woodland Impacts

None identified.

3.17 Wildlife

3.17.1 Affected Environment

Wetland and upland communities in the study area provide habitat for a variety of mammals, songbirds, waterfowl, raptors, amphibians, insects, and reptiles. Common mammals found in upland habitats include white-tailed deer, opossum, shrews, gray and red squirrels, red fox, raccoon, striped skunk, cottontail rabbit, coyote, woodchucks, mice, gophers, chipmunks, voles, and weasels. Common bird species include American goldfinch, wild turkey, sparrows, owls, wrens, thrushes, warblers, hawks, woodpeckers, and vireos. Common reptiles include brown snake, garter snake, eastern milk snake, fox snake, and turtles.

During the study, a local conservationist and Monarch butterfly observer noted that a large migratory population of Monarch butterflies uses the Milwaukee County Grounds, near the

Eschweiler Buildings. This location is part of a corridor used by the Monarch butterflies as part of their migration path every year; most heavily used from late August through September as the Monarch butterflies migrate south. The greatest concentration of Monarch butterflies on the grounds can be found in trees near the Eschweiler Buildings. The butterflies use the trees in this area for roosting and adjacent meadow, including a berm along US 45, for nectaring. The berm may also enhance the attractiveness of the site by providing a wind break. While there is a population of Monarch butterflies in the study area, they have no special regulatory protection.

3.17.2 Wildlife Impacts

No-Build Alternative

The No-Build Alternative would not affect wildlife.

Modernization Alternatives

Each Modernization Alternative would have the same impact on wildlife. The primary impact associated with the loss of upland plant communities is loss of wildlife habitat that serves movement corridors and provides cover for breeding, foraging, and resting. Other wildlife impacts caused by removing vegetation include interrupting the natural succession to mature communities; increasing the potential for soil erosion; and reducing aesthetic values.

A State of Wisconsin-listed threatened animal, the Butler's garter snake, is present in the study corridor. Section 3.18, Threatened and Endangered Species, discusses the issues associated with this species.

The Modernization Alternatives would not affect the trees adjacent to the Eschweiler Buildings that are used by the Monarch butterflies for roosting. The southern half of the berm, between US 45 and the nectaring area, would be removed under both Modernization Alternatives. This would remove some of the nectaring area and part of the wind break that increases the area's attractiveness to the Monarchs. The northern part of the berm would still provide a wind break for the roosting area and the northern part of the nectaring meadow.

3.17.3 Measures to Mitigate Adverse Wildlife Impacts

None identified.

3.18 Threatened and Endangered Species

3.18.1 Affected Environment

The DNR Bureau of Endangered Resources indicates the following threatened and endangered species may be present in the project corridor[5] (see DNR letters dated May 18, 2007, and August 8, 2007, in Appendix D):

[5] The exact locations of threatened and endangered species located in the Zoo Interchange corridor during this study or previous surveys are not disclosed in this document at DNR's request.

State-Listed Species

- Endangered plants:
  - Ravenfoot sedge (*Carex crus-corvi*)
  - False hop sedge (*Carex lupuliformis*)
  - Bluestem goldenrod (*Solidago caesia*)
- Threatened plants:
  - Forked aster (*Aster furcatus*)
  - Handsome sedge (*Carex formosa*)
- Endangered animals:
  - None identified
- Threatened animals:
  - Butler's garter snake (*Thamnophis butleri)*
  - Blanding's turtle (*Emydoidea blandingii*)

WisDOT's 2007 field survey did not find any threatened and/or endangered plant species in the project corridor. A previous sighting of a single Blanding's turtle occurred near the Zoo Interchange according to DNR records.

The Butler's garter snake is a reptile that prefers wet-mesic prairies, marshes, and adjacent grassy and open areas. DNR has categorized the Butler's garter snake habitat in southeast Wisconsin into three tiers. Tier 3 habitat is the best for the snakes and DNR requires mitigation in the same habitat patch for any encroachment onto Tier 3 habitat. The one area of Tier 3 habitat within the study area is along the north leg. There is no Tier 1 or Tier 2 Butler's garter snake habitat in the Zoo Interchange study area.

A Butler's garter snake field survey conducted for MMSD's Milwaukee County Grounds floodwater management facility and the Underwood Creek restoration project found Butler's garter snakes residing in the Tier 3 habitat within the Zoo Interchange study area.

Federally-Listed Species

There are no federally-listed threatened or endangered species or locations in the study area.

Other Protected Species

The Migratory Bird Treaty Act of 1918 states that unless permitted by regulation, it is unlawful to kill or capture migratory birds or destroy their eggs and nests. This law protects barn swallows that commonly nest under bridges.

3.18.2 Threatened and Endangered Species Impacts

No-Build Alternative

The No-Build Alternative would not affect threatened or endangered species.

Modernization Alternatives

US 45 crosses over the Tier 3 Butler's garter snake habitat, and the Modernization Alternatives would affect Butler's garter snake habitat. Removing the existing bridge and

constructing a new bridge has the potential to harm Butler's garter snakes and will make it difficult for the snakes to cross under US 45 during construction.

Based on a spring 2009 survey, four bridges in the study area currently have swallow nests under them. These bridges would be removed and replaced.

3.18.3 Measures to Mitigate Adverse Threatened and Endangered Species Impacts

Bridges and culverts have been inspected to determine if any migratory birds are present.

WisDOT will coordinate with DNR to develop appropriate measures to mitigate adverse effects to the Butler's garter snake. Potential measures include designing the recommended alternative to minimize impacts to the Tier 3 habitat, fencing to keep the snakes out of the construction area, and trapping or hand-collecting snakes that are inside the fenced area prior to construction. The fencing will be installed prior to March 15 each year to isolate the area that will be disturbed. If the fencing is in place prior to March 15, snakes would not need to be removed from inside the fenced area.

Currently, only Tier 3 habitat requires fencing be put in place. Future DNR strategy may require snake fencing be put in place at Tier 1 and 2 Butler's garter snake habitat areas.

Any area with potential habitat for the Blanding's turtle will be fenced with turtle fencing. The fencing will be in place by March 15.

WisDOT will remove swallow nests from the underside of bridges prior to construction, between August 20 and May 15. The nests are unoccupied during this period. After swallow nests are removed, WisDOT will place nets under the bridge to keep swallows from re-establishing nests on bridges that are about to be removed.

3.19 Noise

3.19.1 Affected Environment

Sound is a form of vibration that causes pressure variations in elastic media such as air and water. Noise is defined as unwanted and disruptive sound. The ear is sensitive to this pressure variation and perceives it as sound. The intensity of these pressure variations causes the ear to discern different levels of loudness. These pressure differences are most commonly measured in decibels.

The decibel (dB) is the unit of measurement for sound. The decibel scale audible to humans spans approximately 140 dB. A level of zero decibels corresponds to the lower limit of audibility, while 140 dB produces a sensation more like pain than sound. The decibel scale is a logarithmic representation of the actual sound pressure variations. Therefore, a 26 percent change in the energy level only changes the sound level 1 dB. The human ear would not detect this change except in a controlled environment. Doubling the energy level would result in a 3-dB increase, which would be barely perceptible in the natural environment. Tripling the energy sound level would result in a clearly noticeable change of 5-dB in the sound level. A change of 10 times the energy level would result in a 10-dB change in the sound level. This would be perceived as a doubling (or halving) of the apparent loudness.

The human ear has a non-linear sensitivity to noise. To account for this in noise measurements, electronic weighting scales are used to define the relative loudness of different frequencies. The "A" weighting scale is widely used in environmental work because it closely resembles the non-linearity of human hearing. Therefore, the unit of measurement for a decibel A-weighted noise level is dBA.

Traffic noise is not constant. It varies as each vehicle passes a point. The time-varying characteristics of environmental noise are analyzed statistically to determine the duration and intensity of noise exposure. In an urban environment, noise is made up of two distinct parts. One is ambient or background noise. Wind noise and distant traffic noise make up the acoustical environment surrounding the project. These sounds are not readily recognized, but combine to produce a non-irritating ambient sound level. This background sound level varies throughout the day, being lowest at night and highest during the day. The other component of urban noise is intermittent and louder than the background noise. Transportation noise and local industrial noise are examples of this type of noise. It is for these reasons that environmental noise is analyzed statistically.

The statistical descriptor used for traffic noise is L_{eq}. L_{eq} is the constant, average sound level, which over a period of time contains the same amount of sound energy as the varying levels of the traffic noise. The L_{eq} correlates reasonably well the effects of noise on people. It is also easily measurable with integrating sound level meters. The time period for traffic noise is 1 hour. Therefore, the unit of measure for traffic noise is L_{eq}(1h) dBA.

Highway noise sources have been divided into 5 types of vehicles; automobiles, medium trucks, heavy trucks, buses, and motorcycles. Each vehicle type is defined as follows:

- Automobiles—All vehicles with 2 axles and 4 tires, includes passenger vehicles and light trucks, less than 10,000 pounds.
- Medium trucks—All vehicles having 2 axles and 6 tires, vehicle weight between 10,000 and 26,000 pounds.
- Heavy trucks—All vehicles having 3 or more axles, vehicle weight greater than 26,000 pounds.
- Buses—All vehicles designed to carry more than 9 passengers.
- Motorcycles—All vehicles with 2 or 3 tires and an open-air driver/passenger compartment.

Noise levels produced by highway vehicles can be attributed to 3 major categories:

- Running gear and accessories (tires, drive train, fan, and other auxiliary equipment)
- Engine (intake and exhaust noise, radiation from engine casing)
- Aerodynamic and body noise

Tires are the dominant noise source at speeds greater than 50 mph for trucks and automobiles. Tire sound levels increase with vehicle speed but also depend upon road surface, vehicle weight, tread design and wear. Change in any of these can vary noise levels. At lower speeds, especially in trucks and buses, the dominant noise source is the engine and related accessories.

Noise Level Measurements

Existing noise level measurements were conducted on April, 23, 2009, at 12 representative residential areas adjacent to the Zoo Interchange study-area. The measurements were made in accordance with FHWA guidelines using an integrating sound level analyzer meeting American National Standards Institute and International Electrical Commission Type 1 specifications. Noise measurements were conducted for a period of 20 minutes at each site. Traffic counts were taken at each site, concurrent with the noise measurements when traffic was visible from the site. **Table 3-17** presents the data collected at the 12 sites. The location of the field sites are shown **Exhibits 2-6 through 2-18**.

TABLE 3-17
Measured Existing Noise Levels

Field Site	Site Description and Distance From Road	Noise Level dBA L_{eq} (h)
1	Residence, 49 ft east of N. 112th Street and 6 ft north of W. Clarke Street	64
2	Residence, 230 ft north of W. Meinecke Avenue and 18' west of N. 113th Street	69
3	Residence, 69 ft west of N. 97th Street and 417 ft south of W. Wisconsin Avenue	64
4	Wil-O-Way, 45 ft NE of right-of-way, between play structure and swing set	67
5	Chippewa Park, 94 ft south of W. Park Hill Avenue and 95 ft west of N. 111th Street	67
6	Residence, 55 ft northwest of W. Bungalow Pkwy and 8 ft southwest of S 105th Street	58
7	Residence, 275 ft east of I-894 and 10 ft north of W. Becher Street	62
8	Residence, 50 ft west of S 100th Street and 2 ft north of W. Washington Street	64
9	Residence, 49 ft north of W. O'Connor Street and 15 ft west of S. 80th Street	61
10	Residence, 17 ft south of W. Kearney Street and 12ft east of S. 75th Street	67
11	Residence, 124 ft north of I-94 and 7 ft east of W. Dixon Street	66
12	Residence, 32 ft east of W. Adler Street and 6 ft west of S. 89th Street	67

Comparison of Field Data Versus Modeled Noise Levels

The FHWA Traffic Noise Model® (TNM) Version 2.5 was used to model the field measurements, using traffic data counted during the measurements. WisDOT compared the field measurements to the output from TNM to assess the applicability of the model to the specific conditions in the study area.

Comparing the modeled noise levels to the field-measured noise levels confirms the applicability of the computer model to this project. Traffic counts concurrent with the noise measurements were taken all 12 the measurement sites. The traffic data from these 12 sites was used in the model. The modeled traffic counts at 10 of the 12 sites compared within ±3 dB of the measured levels. This represents reasonable correlation since the human ear can barely distinguish a 3-dB change in the L_{eq}(1h) noise level in the urban environment. The site-by-site comparison is presented in **Table 3-18**.

TABLE 3-18
Comparison of Measured and Modeled Noise Levels

Field Site	Noise Level, dBA L_{eq}		Difference in Noise Level, dBA L_{eq} (Modeled Noise Level Minus Measured Noise Level)
	Measured	Modeled	
1	64	67	3
2	69	72	3
3	64	65	1
4	67	70	3
5	67	69	2
6	58	60	2
7	62	67	5
8	64	62	-2
9	61	62	1
10	67	70	3
11	66	69	3
12	67	71	4

3.19.2 Noise Impacts

The noise analysis presents the existing and future noise levels at various locations in the study area. The determination of noise abatement measures and locations is in compliance with the Wisconsin Administrative Code, Trans 405, Siting Noise Barriers, effective September 1989. TRANS 405 is WisDOT's FHWA approved interpretation of 23 CFR Part 772. The noise level criteria for considering barriers abutting various land uses are presented in **Table 3-19**. The noise level descriptor used is the equivalent sound level, L_{eq}(1h), defined as the steady state sound level which, in a stated time period (usually one hour) contains the same sound energy as the actual time-varying sound.

Noise abatement measures will be considered when the predicted noise levels approach or exceed those values shown for the appropriate activity category in **Table 3-19**, or when the predicted traffic noise levels substantially exceed the existing noise levels. "Approach" is defined as being within 1 dBA less than the noise levels shown in **Table 3-19**. The WisDOT has defined an increase over existing noise levels of 15 decibels or more as being a noise impact.

The FHWA Traffic Noise Model®, Version 2.5 (Lau et al., 2004) was used to model existing (2004) and 2035 6- and 8-lane Alternatives noise levels.

The project was divided into 4 legs:

- North Leg: Alternatives N1 and N3
- East Leg: Alternatives E1 and E1/E3 Hybrid Alternative
- South Leg: Alternative S2
- West Leg: Alternative W3

TABLE 3-19
Noise Level Criteria for Considering Barriers

Activity Category	L_{eq}(1h) (dBA)[1]	Description of Land Use Category
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the lands are to continue to serve their intended purpose.
B	67 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals
C	72 (Exterior)	Developed lands, properties or activities not included in Categories A or B above
D	—	Undeveloped lands
E[2]	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals and auditoriums

[1.] "Leq" means the equivalent steady-state sound level, which in a stated period of time contains the same acoustic energy as the time-varying sound level during the same period. For purposes of measuring or predicting noise levels, a receptor is assumed to be at ear height, located five feet above ground surface.

[2.] Use of interior noise levels shall be limited to situations where exterior noise levels are not applicable.
Source: Wisconsin Administrative Code, Trans 405, Effective September 1, 1989

The following parameters were used in this model to calculate an hourly L_{eq}(1h) at a specific receiver location:

- Distance between roadway and receiver
- Relative elevations of roadway and receiver (all receivers are assumed to be 5 feet off the ground)
- Hourly traffic volume in light-duty (two axles, four tires), medium-duty (two axles, six tires), and heavy-duty (three or more axles) vehicles
- Vehicle speed
- Roadway grade
- Topographic features, including retaining walls and berms
- Noise source height of the vehicles

Exhibits 2-6 through 2-18 show 180 representative receiver locations numbered N1 through N180. These receivers were selected to model the representative noise impacts at 533 residences (including apartments), 5 churches, 3 schools (including playgrounds, athletic fields, and a tennis court), Milwaukee County Medical Complex, County Grounds Buildings, the Milwaukee County Zoo, and 41 commercial properties adjacent to the proposed project. The results of the computer modeling by leg are presented in Appendix B. (Note that existing noise levels in Appendix B take into account existing noise walls, but future noise levels do not take into account the reduction in noise levels that would occur with noise walls. WisDOT plans to provide noise walls at all the locations that currently have noise walls.)

The horizontal and vertical alignments of the proposed improvements are substantially different in some areas than what exists today. Therefore, in some areas design year noise levels could change by as much as 14 decibels compared to existing noise levels. The projected changes in the study are summarized by leg in **Table 3-20**.

TABLE 3-20
Change in Design Hour Noise Levels

Roadway Section	Change in Noise Level, dBA L_{eq}
North Leg	-12 to +3
East Leg	-12 to +5
South Leg	-9 to +14
West Leg	-5 to +2

Design year peak hour noise levels, as presented in Appendix B, differ for each alternative. Likewise, the number of properties that would be exposed to the noise levels that approach or exceed the noise levels in Table 3-16 also differ for each alternative. The projected number of properties that would be exposed to design year noise levels that approach or exceed the levels in **Table 3-19** are presented in **Table 3-21**.

3.19.3 Measures to Mitigate Adverse Noise Impacts Effects

Based upon the requirements of 23 CFR 772 and within the framework of TRANS 405, various methods were reviewed to mitigate the noise impact of the proposed improvements. Among those considered were restricting truck traffic to specific times of the day, prohibiting trucks, altering horizontal and vertical alignments, property acquisition for construction of noise barriers or berms, property acquisition to create buffer zones to prevent development that could be adversely impacted, and insulating public use or nonprofit institutional buildings, berms, and sound barriers.

Restricting or prohibiting trucks is counter to the project's purpose and need. Design criteria and recommended termini for the proposed project preclude substantial horizontal and vertical alignment shifts that would produce noticeable changes in the projected acoustical environment. Due to right-of-way limitation the construction of noise berms is neither feasible nor reasonable. Therefore, only the construction of noise barriers was reviewed. Abatement is recommended only when it is feasible and reasonable to construct a noise barrier.

TRANS 405, Siting Noise Barriers, has established criteria for determining feasibility and reasonableness and is summarized as follows:

- The barrier must provide a minimum 8-dB reduction.
- The total cost of the barrier may not exceed $30,000 per abutting residence.
- There must be a formal resolution from the local government supporting the noise barrier.
- The local government must provide documentation of land use controls, which would reasonably eliminate the need for noise barriers adjacent to future developments that abut freeways or expressways.

TABLE 3-21
Noise Impact Summary

	8 Lanes						6 Lanes					
	North Leg		East Leg		South Leg	West Leg	North Leg		East Leg		South Leg	West Leg
	N1	N3	E3	E1	S2	W3	N1	N3	E3	E1	S2	W3
Residences	61	67	59	87	87	5	61	65	44	82	87	1
Apartment units	37	37	7	6	74	0	37	31	7	4	74	0
Churches	0	1	0	1	2	0	0	1	0	1	2	0
Schools	2	2	0	0	1	0	2	2	0	0	1	0
School athletic fields	2	2	0	0	0	0	2	2	0	0	0	0
School tennis court	1	1	0	0	0	0	1	1	0	0	0	0
Milwaukee County Medical Complex (number of buildings)	0	1	0	0	0	0	0	1	0	0	0	0
County Grounds (number of buildings)	0	0	0	0	0	0	0	0	0	0	0	0
Milwaukee County Zoo	0	0	0	0	0	1	0	0	0	0	0	1
Commercial properties	3	4	2	1	2	6	3	4	1	1	2	6

Noise barriers were analyzed at 27 locations adjacent to the study-area freeway system. The results of the barrier analysis, including barrier location, future L_{eq}(1h) noise levels without and with a barrier, barrier length and height, estimated cost, the number of residential units benefited, the noise reduction provided by the barrier and the cost per residential unit are presented in **Table 3-22**. Twenty three of the 27 noise barriers analyzed would meet WisDOT's feasibility criteria. However, only 8 noise barriers would meet both of TRANS 405's definitions for feasible and reasonable noise mitigation.

There are numerous areas adjacent to the study-area freeway system where individual receptors or small groupings of residences exceed the noise levels in **Table 3-19**. However, it is impossible to design a noise barrier for these receptors that would provide an 8-decibel reduction and still meet the TRANS 405, $30,000 per residence criteria.

The 66 dBA L_{eq}(1h) setback distance along undeveloped areas abutting the study-area freeway system would be 385 feet. The setback distance indicates that noise levels within these distances, measured perpendicular to the centerline of the nearest lane in either direction, is 66 dBA or greater. This setback distance was developed to assist local planning authorities in developing land use control over the remaining undeveloped lands along the project in order to prevent further development of incompatible land use. Noise mitigation for future developments constructed within the setback distance will be the responsibility of the local communities or the developer.

Based on the study, and as shown in **Table 3-22**, WisDOT intends to replace the existing noise barriers and install the additional feasible and reasonable noise barriers. During the next phases of the project, as locations of retaining walls are more accurately defined relative to the surrounding areas, the location of feasible and reasonable noise mitigation will be reassessed. If final design results in substantial changes in roadway design from the conditions modeled for the DEIS or FEIS, noise abatement measures will be reviewed.

During the public comment period on this Draft EIS, comments on noise concerns will be solicited at the public hearing from local residents, and officials from the jurisdictions affected by the project. These comments will be used to prepare the Final EIS. A final decision on installing abatement measures will be made upon completion of the project design and the public involvement process.

3.20 Air Quality

3.20.1 Affected Environment

The Clean Air Act of 1970 established National Ambient Air Quality Standards (NAAQS). These were established to protect public health, safety, and welfare from known or anticipated effects of air pollutants. The most recent amendments to the NAAQS contain criteria for sulfur dioxide (SO_2), particulate matter (PM_{10}, 10-micron and smaller along with $PM_{2.5}$, 2.5 micron), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), and lead (Pb). **Table 3-23** present the National and Wisconsin Ambient Air Quality Standards.

TABLE 3-22
Acoustical Mitigation—Noise Barrier Locations Analyzed

Barrier Number	Locations	Existing L_{eq}(1h) Noise Levels, dBA	Range of Future L_{eq}(1h) Noise Levels, dBA		Noise Reduction (dB)	Barrier Characteristics		Cost[a]	Number of Units Attenuated	Cost/ Unit	Feasible and Reasonable
			w/o Barrier	Barrier		Length (ft)	Height (ft)				
North Leg N1, N3											
1-N1	East of US 45 and south of Bluemound Road	68–76	60–67	57–63	3–7	1,209	15–21	$404,720	16	$25,295	N
2	East of US 45 and north of North Avenue	66–75	67–72	60–65	5–9	2,193	12–21	$692,307	22	$31,469	N
3	East of US 45 and north of Center Street	71	67	60	7	726	21	$274,516	1	$274,516	N
4	West of US 45, just south of Burleigh Street to Meinecke Avenue	68–77	63–78	59–66	4–14	3,615	18–21	$1,328,784	12	$110,732	N
5	West of US 45, between Meinecke Avenue and North Avenue	68–73	67–71	60–62	7–9	1,086	15–18	$326,178	11	$29,653	Y
6	West of US 45, approximately 550 ft south of North Avenue and south	75–76	77	64–72	5–13	1,045	9–21	$239,519	5	$47,904	N
7-N1	West of US 45, between Wisconsin Avenue and Bluemound Road	68–74	67–69	61–64	3–8	1,472	15–21	$502,383	9	$55,820	N
1-N3	East of US 45 and south of Bluemound Road	68–76	62–66	58–59	3–8	899	18–21	$323,710	16	$20,232	N
1A-N3	East of US 45, between Bluemound Road and Wisconsin Avenue	67–73	66–70	60–67	3–8	945	15	$255,228	5	$51,046	N
7-N3	West of US 45, between Wisconsin Avenue and Bluemound Road	68–74	69–71	62–68	1–9	951	15	$256,839	9	$28,538	Y
East Leg E3, E1											
14-E3	South of I-94, west and east of 92nd Street	69–74	65–67	59	6–8	3,098	15–21	$1,090,854	26	$41,956	N
	South of I-94 and west of 84th Street	71–74	66–69	57–60	8–9	2,264	12–21	$709,830	7	$101,404	N
15-E3	South of I-94 and east of 76th Street	68–74	67–72	60–66	3–10	1,923	6–21	$565,515	8	$70,689	N
16-E3	North of I-94 and east of 76th Street	64–73	69–74	61–65	7–10	2,166	12–21	$629,096	12	$52,425	N

TABLE 3-22
Acoustical Mitigation—Noise Barrier Locations Analyzed

Barrier Number	Locations	Existing L_{eq}(1h) Noise Levels, dBA	Range of Future L_{eq}(1h) Noise Levels, dBA		Noise Reduction (dB)	Barrier Characteristics		Cost[a]	Number of Units Attenuated	Cost/ Unit	Feasible and Reasonable
			w/o Barrier	Barrier		Length (ft)	Height (ft)				
17-E3	North of I-94 and east of 84th Street	65-68	67-68	64-66	2-3	996	12-15	$225,920	5	$45,184	N
18-E3	North of I-94 and west of 92nd Street	70-75	66-73	59-62	7-11	1,775	18-21	$627,189	12	$52,266	N
14-E1	South of I-94 and west of 84th Street	69-77	66-75	59-67	6-10	3,570	9-18	$968,635	52	$18,628	Y
15-E1	South of I-94 and east of 76th Street	68-74	67-72	60-65	2-10	1,923	12-21	$620,921	8	$77,615	N
16-E1	North of I-94 and east of 76th Street	64-73	68-74	63-66	3-10	2,352	12-21	$701,185	9	$77,909	N
17-E1	North of I-94 and east of 84th Street	63-68	68-69	64-69	0-4	1,396	21	$527,681	--	$527,681	N
18-E1	North of I-94 and west of 92nd Street	70-75	66-72	58-62	8-11	2,084	9-21	$691,614	11	$62,874	N
South Leg S2											
8	West of I-894 and north of Greenfield Avenue	63-72	69-72	62-65	7-9	1,302	12-18	$356,898	12	$29,742	Y
9	West of I-894 and south of Greenfield Avenue	69-77	67-78	59-70	8-11	2,286	12-21	$671,937	22	$30,543	Y
10	West of I-894 and north of Lincoln Avenue	60-64	66-78	59-66	7-12	2,474	12-21	$750,217	70	$10,717	Y
11	East of I-894 and north of Lincoln Avenue	67-74	64-73	60-64	4-9	1,907	9-21	$661,940	13	$50,918	N
12	East of I-894 and south of Greenfield Avenue	69-71	61-66	58	3-8	1,005	21	$379,972	14	$27,141	Y
13	East of I-894 and north of Greenfield Avenue	67-72	68-72	61-67	2-10	2,797	18	$906,276	38	$23,849	Y

[a] Based on $18.00 per square foot

TABLE 3-23
National and Wisconsin Ambient Air Quality Standards

Pollutant	Primary Standard[a]	Averaging Time	Secondary Standard[b]
Carbon Monoxide (CO)	9 ppm (10 mg/m^3)	8 hour[c]	None
	35 ppm (40 mg/m^3)	1 hour[c]	None
Lead (Pb)	0.15 µg/m^3	Rolling 3-Month Average[d]	Same as Primary
	1.5 µg/m^3	Quarterly Average	Same as Primary
Nitrogen Dioxide (NO_2)	0.053 ppm (100 µg/m^3)	Annual (Arithmetic Mean)	Same as Primary
Particulate Matter (TSP) WI[e]	None	24 hour[c]	150 µg/$m^{3(c)}$
Particulate Matter (PM_{10})	150 µg/m^3	24 hour[f]	
Particulate Matter ($PM_{2.5}$)	15 µg/m^3	Annual[g] (Arithmetic Mean)	Same as primary
	35 µg/m^3	24 hour[h]	
Ozone (O_3) WI	0.12 ppm (235 µg/m^3)	1 hour	Same as primary
Ozone (O_3)	0.075 ppm (2008 std)	8 hour[j]	Same as primary
	0.08 ppm (1997 std)	8 hour[j]	Same as primary
Sulfur Dioxides (SO_2)	0.03 ppm (80 µg/m^3)	Annual (Arithmetic Mean)	
	0.14 ppm (365 µg/m^3)	24 hour[c]	
		3 hour[c]	0.5 ppm (1300 µg/m^3)

[a] "Primary air standard" means the level of air quality, which provides protection for public health with an adequate margin of safety.

[b] "Secondary air standard" means the level of air quality, which may be necessary to protect welfare from unknown or anticipated adverse effects.

[c] Not to be exceeded more than once per year.

[d] Final Rule signed October 15, 2008.

[e] PM_{10} standards were adopted and most total suspended particulate matter (TSP) standards were deleted when the Wisconsin Administrative Code was revised in 1989. The 24-hour secondary TSP standard was retained. The TSP secondary standard is specific to Wisconsin and should not be confused with the National Ambient Air Quality Standards, which are developed by the U.S. EPA.

[f] Not to be exceeded more than once per year on average over 3 years.

[g] To attain this standard, the 3 year average of the weighted annual mean PM2.5 concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m3.

[h] To attain this standard, the 3 year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m3 (effective December 17, 2006).

[i] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm (effective May 27, 2008).

[j] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.

The 1997 standard – and the implementation rules for that standard – will remain in place for implementation purposes as U.S. EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.

Source: http://www.epa.gov/air/criteria.html, accessed April 20, 2009 and Wisconsin Administrative Code, Chapter NR 404, May, 2005.

Congress directed U.S. EPA to update the standards with current science at least every 5 years, and that proposals to revise them should be based solely upon the best current scientific opinion on public health effects, not economic impacts. Since initially setting

standards in the early 1970s, U.S. EPA has changed the standards only twice: in 1979 and in 1987. Under its most recent review in 1997, U.S. EPA concluded that the current primary standards for ozone and particulate matter were not adequate to protect the public from adverse health effects.

The Clean Air Act Amendments of 1977 and 1990 required all states to submit a list to U.S. EPA identifying those air quality regions, or portions thereof, which meet or exceed the NAAQS or cannot be classified because of insufficient data. Portions of air quality control regions that exceed the NAAQS for any criteria pollutant are designated as non-attainment areas for that pollutant. The Clean Air Act Amendments also established time schedules for the states to attain the NAAQS.

Based upon Congress's requirement to review the NAAQS, U.S. EPA recently lowered the 8-hour ozone standard from 0.08 ppm to 0.075 ppm, and added a new 3-month average criterion for lead. The secondary standards are the same as the primary standard for both of these new standards. The primary pollutants from motor vehicles are unburned hydrocarbons, nitrogen oxides, and carbon monoxide. Volatile organic compounds and nitrogen oxides can combine in a complex series of reactions, catalyzed by sunlight, to produce photochemical oxidants, such as ozone and nitrous oxide (N_2O). Because these reactions take place over a period of several hours, maximum concentrations of photochemical oxidants are often found far downwind of the precursor sources. These pollutants are regional problems. The modeling procedures for ozone and NO_2 require long-term meteorological data and detailed area wide emission rates for all potential sources. SEWRPC performs modeling of these pollutants for the State Implementation Plan (SIP).

Carbon monoxide is a colorless and odorless gas that is the by-product of incomplete combustion, and is the major pollutant from gasoline-fueled motor vehicles. Carbon monoxide emissions are greatest from vehicles operating at low speeds and prior to complete engine warm-up (within approximately 8 minutes of starting). Congested urban roads tend to be the principal problem areas for carbon monoxide.

In addition to the NAAQS criteria for air pollutants, U.S. EPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners), and stationary sources (e.g., factories or refineries).

In April 2007, under authority of the Clean Air Act CAA Section 202(l), U.S. EPA signed a final rule, Control of Hazardous Air Pollutants from Mobile Sources, which sets standards to control MSATs. Under this rule, U.S. EPA set standards on fuel composition, vehicle exhaust emissions, and evaporative losses from portable containers. Beginning in 2011, refineries will be required to limit the annual benzene content of gasoline to an annual average refinery average of 0.62 percent. The rule also sets a new vehicle exhaust emission standard for non-methane hydrocarbon including MSAT compounds, to be phased in between 2010 and 2013 for lighter vehicles and 2012 and 2015 for heavier vehicles.

Greenhouse gases are trace gases that trap heat in the earth's atmosphere. Some greenhouse gases such as carbon dioxide occur naturally and are emitted to the atmosphere through natural processes and human activities. Other greenhouse gases (e.g., fluorinated gases) are created and emitted solely through human activities. The principal greenhouse gases that

enter the atmosphere because of human activities are carbon dioxide (CO_2), methane (CH_4), N_2O, and fluorinated gases (U.S. EPA, 2008a).

Exceeding the NAAQS pollutant level does not necessarily constitute a violation of the standard. Some of the criteria pollutants (including CO) are allowed one exceedance of the maximum level per year, while for other pollutants, criteria levels cannot be exceeded. Violation criteria for still other pollutants are based on recorded exceedances. **Table 3-23** lists the allowable exceedances for U.S. EPA criteria pollutants.

The study-area freeway system is located within the Southeastern Wisconsin Intrastate Air Quality Control Region #239. Milwaukee County is currently in attainment status for six of the seven criteria pollutants, and has been classified as being in moderate non-attainment for the 8-hour ozone standard. As stated above, Milwaukee County is in attainment for $PM_{2.5,}$ as based on the present designation. The air quality monitoring network in southeastern Wisconsin indicates that it is likely that the study areas may be designated as being in non-attainment for the revised $PM_{2.5}$ standard, which became effective on December 17, 2006. DNR has submitted information to the U.S. EPA to assist in the determinations. A final determination on the attainment designation is expected during the second quarter of 2009. If the designation changes from attainment to non-attainment, SEWRPC and DNR will develop measures to control $PM_{2.5}$ emissions in accordance with U.S. EPA guidelines so that the region will be in attainment by 2015.

3.20.2 Air Quality Impacts

The air quality impact analysis for this project was conducted in accordance with WisDOT, DNR, FHWA, and U.S. EPA procedures. The project is subject to Wisconsin Administrative Code NR 411 Construction and Operation Permits for Indirect Sources. NR 411 has established traffic volume thresholds for new highways and modified highways. The increase in mainline traffic volumes on I-894 south of the Zoo Interchange exceeded the criteria in NR 411. Therefore, WisDOT and FHWA performed a CO screening analysis of the proposed improvements to determine if future CO concentrations would exceed 75 percent of any ambient air quality standard for CO.

Recent FHWA regulations require an assessment of MSATs. As a result WisDOT and FHWA performed a quantitative analysis of MSAT emissions. The results of the MSAT analysis are summarized in this section and described in more detail in Appendix C.

Carbon Monoxide Screening Analysis

The CO screening analysis, as prescribed in NR 411.04(2)(c), was performed along I-894 as it passes under Greenfield Avenue and included traffic volumes on the mainline, Greenfield Avenue and all ramps to and from I-894. According to NR 411, "If the screening analysis results indicate that no receptor location will be exposed to more than 75 percent of any ambient air quality standard for carbon monoxide, no permit is required." The 75 percent threshold is 26.25 ppm and 6.75 ppm, respectively for the 1-hour and the 8-hour standard.

U.S. EPA-approved computer models, MOBILE6.2 (U.S. EPA, 2003) and CAL3QHC 2.0 (U.S. EPA, 1995b) were used to analyze the emissions and dispersion of CO within the microscale study area described in the previous paragraph. MOBILE6.2 is a U.S. EPA computer program for calculating average vehicle CO emission rates. The DNR provided the specific 2016 and 2026 input variables for MOBILE6.2 for Milwaukee County (DNR, 2009).

CAL3QHC is a pollutant dispersion-modeling program for predicting pollutant concentrations from motor vehicles under free-flow or idling conditions. CAL3QHC was used to model traffic on the study-area freeway system, local streets around the two schools and all queued traffic at the four stop-sign controlled intersections near the schools. Peak one-hour and eight-hour traffic volumes were used to determine the maximum one-hour and eight-hour CO concentrations. The CO concentrations at 23 locations along Greenfield Avenue and adjacent buildings were modeled. The results of the CO screening analysis for the locations representing the five highest concentrations are presented in **Table 3-24.** Since none of the CO concentrations exceed the 75 percent criteria, an Indirect Source Permit is not required. The results of the CO screening analysis, along with the MOBILE6.2 and CAL3QHC data files, were sent to the DNR Bureau of Air Management in May 2009, requesting concurrence on the screening analysis.

TABLE 3-24
Maximum Projected Carbon Monoxide Concentrations

	Carbon Monoxide (ppm)			
	1-Hour Peak[a]		8-Hour Average[b]	
Receptor Site: I-894 @ Greenfield Ave	Construction Year (2016)	Construction Year Plus 10 Years (2026)	Construction Year (2016)	Construction Year Plus 10 Years (2026)
A4 – North sidewalk on Greenfield Ave. bridge over I-894, at stop line for traffic signal	8.6	8.7	4.6	4.5
A5 – North sidewalk on Greenfield Ave. bridge over I-894, 82 ft east of stop line for traffic signal	11.8	12.0	5.9	5.9
A6 – North sidewalk on Greenfield Ave. on bridge over I-894, 164 ft east of stop line for traffic	12.8	13.4	6.5	6.6
A13 – South sidewalk on Greenfield Ave, 82 ft west of stop line for traffic signal	5.1	5.1	2.8	2.9
A14 – South sidewalk on Greenfield Ave. at stop line for traffic signal	5.1	5.2	2.8	2.8

[a] Includes 1-hour ambient background CO concentration of 1.0 ppm
[b] Includes 8-hour ambient background CO concentration of 0.8 ppm
Screening threshold, 1-hour 26.25 ppm; 8-hour 6.75 ppm

MSAT Analysis

In February 2006, FHWA issued guidance for the analysis of MSATs in the NEPA process for highway projects (FHWA, 2006a). The FHWA has developed a tiered approach for analyzing MSATs in NEPA documents. Depending on the specific project circumstances, FHWA has identified three levels of analysis:

- No analysis for projects with no potential for meaningful MSAT effects.
- Qualitative analysis for projects with low potential MSAT effects.
- Quantitative analysis to differentiate alternatives for projects with higher potential MSAT effects.

Since projected traffic volumes by 2035 are projected to exceed 150,000 vpd along a few segments of the corridor, this project required a quantitative analysis due to the higher potential for MSAT effects.

The MSAT analysis indicates that by 2036 with either Build Alternative, MSAT pollutants will decrease 51 to 56 percent for five of the six priority air toxics and over 90 percent for diesel particulate and exhaust organic gases from 2004 conditions. The total vehicles miles of travel (VMT) estimated for the 6-lane Alternative is slightly less than the 8-lane Alternative, as the VMT on local streets decreased more than the VMT on the study-area freeway system increased. This slight difference is created because the additional capacity would reduce congestion on the study-area freeway system and attract trips from the local streets. This increase in VMT would lead to slightly higher MSAT emissions along the study-area freeway system, but still substantially below 2004 levels. The increased VMT on both the study-area freeway system and the local streets is offset by lower MSAT emission rates due to increased speeds. According to U.S. EPA's MOBILE6.2 emissions model, emissions of all of the priority MSATs except for diesel particulate matter decrease as freeway speeds increase.

The additional travel lanes contemplated as part of the 8-lane Alternative will have the effect of moving traffic closer to some homes, schools and businesses; therefore, there may be localized areas where ambient concentrations of MSATs could be higher compared to the 6-lane Alternative (with both Build Alternatives being considerably lower than existing concentrations). However, as discussed in Appendix C, the magnitude and the duration of these potential increases compared to the No-Build Alternative cannot be accurately quantified due to the inherent deficiencies of current models. In summary, if the study-area freeway system is widened and, as a result, moves closer to some receptors, the localized level of MSAT emissions could be higher than if the freeway were not widened, but this could be offset due to increases in speeds and reductions in congestion (which are associated with lower MSAT emissions). Also, MSATs will be lower in other locations when traffic shifts away from local streets. However, as shown with the MSAT results presented in Appendix C, on a regional basis, U.S. EPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, will cause region-wide MSAT levels to be significantly lower than today.

Particulate Matter

Particulate matter is the general term used for a mixture of solid particles and liquid droplets found in the air. The large particulates settle to the ground, and the smaller stay suspended in the air. Some are visible to the naked eye; others require a microscope to be seen. $PM_{2.5}$, as defined in Section 3.20.2, are particles that are less than or equal to 2.5 μm in diameter and are referred to as fine particles. Due to its small diameter (approximately 1/30 the width of a human hair), and the ability to become lodged in the lungs, $PM_{2.5}$ is believed to pose a health risk (U.S. EPA, 2009). Road dust and soot from wood combustion are referred to as "primary" particles as they are emitted directly into the atmosphere. Particulates that form in the atmosphere from primary gaseous sources are referred to as "secondary" particulates. Examples of secondary particulates include sulfates, formed from SO2 emissions from power plants and industrial facilities, and nitrates, formed from NOx emissions from power plants, automobiles, and other types of combustion sources. The chemical composition of particles depends on location, time of year, and weather. Generally, fine PM contains more secondary particles (U.S. EPA, 2001).

According to U.S. EPA, the 2007 heavy-duty engine standards will result in the introduction of new, highly effective control technologies for heavy-duty engines, beginning in 2007. Particulate matter emission levels are expected to be 90 percent lower per vehicle than 2000 standards levels due to the 2007 diesel engine and fuel program. On-road diesel trucks began to use ultra low sulfur diesel in the fall of 2006. As older heavy-duty diesel vehicles are replaced with newer less polluting vehicles, the heavy-duty diesel truck fleet emission rate is projected to decrease more than 60 percent from 2016 through the 2035 design year.

U.S. EPA's projected decrease in diesel truck particulate emission rates is substantially greater than the projected increase in the number of diesel trucks on I-894. Therefore, $PM_{2.5}$ concentrations in the attainment area in southeastern Wisconsin should decrease.

Conclusion

Based on the air quality analysis completed for the proposed improvements, this project will not contribute to any violation of the NAAQS. MSAT emissions will decrease under both Build Alternatives, and CO levels will not exceed air quality standards.

3.20.3 Measures to Mitigate Adverse Air Quality Impacts

None identified.

3.21 Hazardous Materials

3.21.1 Affected Environment

Based on the initial record search (database search, aerial photographs, topographic maps, historical as-builts, Sanborn maps, etc.) and windshield survey, 115 potential hazardous materials sites and/or parcels were identified adjacent to the study-area freeway system. Sources reviewed for information include regulatory agency (U.S. EPA and DNR) listings, and past or present land use that would indicate the potential for the use or management of hazardous materials or the generation of hazardous waste. If such information was found, the parcel was noted as a potential hazardous material site/parcel. A summary of the initial findings include the following:

Based on the proposed right-of-way acquisition and project excavation requirements, 115 sites and/or parcels were recommended for additional record searches. Of the 115 sites, 104 include former gas stations and fill areas. Potentially contaminated soils and possibly underground storage tanks may be encountered if utilities and storm sewers (locations yet to be determined) are proposed at these sites in the future.

- Of the 115 sites subjected to additional record searches, 37 sites have been recommended for field sampling and testing.
- Bridges to be demolished on the study-area freeway system may include asbestos-containing materials. The results of asbestos surveys will be included in the final environmental document.
- Bridges to be demolished on the study-area freeway system may contain lead-based paint.

3.21.2 Hazardous Material Impacts

No-Build Alternative

The No-Build Alternative would not affect any potentially contaminated sites.

Modernization Alternatives

The Modernization Alternatives would affect many of the 37 potential contaminated sites recommended for further analysis. DNR and other affected parties will be notified of the results of field sampling and testing. WisDOT would work with concerned parties to ensure disposition of any petroleum contamination to the satisfaction of the DNR, WisDOT Bureau of Equity and Environmental Services, and FHWA.

Bridges on the study-area freeway system may contain asbestos. WisDOT considers all paint on bridges to be lead-based paint. All bridges are planned for replacement under the Modernization Alternatives. Buildings to be acquired under the Modernization Alternatives could also contain asbestos and/or lead-based paint. Both asbestos and lead-based paint pose a health risk if inhaled or ingested.

3.21.3 Measures to Mitigate Adverse Hazardous Material Impacts

During the project's real estate acquisition phase, WisDOT will survey all buildings that need to be demolished to determine whether asbestos is present. WisDOT will survey all bridges that will be removed for asbestos and include the results of the survey in the final environmental document. All appropriate and applicable engineering and regulatory controls will be followed during the handling and disposal of asbestos-containing material.

3.22 Soil Resources

3.22.1 Affected Environment

Soils located in the study area were formed mainly in material that was laid down through glaciation and have a high content of clay. Soil associations provide a general idea of the soils located within an area and consist of a landscape that has a distinctive proportional pattern of soils.

The soil association present through the majority of the study area is the Ozaukee-Morley-Mequon association. The U.S. Department of Agriculture Soil Conservation Service Soil Survey states that this soil association consists of well drained to somewhat poorly drained soils that have a subsoil of silty clay loam and silty clay, formed in thin loess and silty clay loam glacial till, on moraines. The land in this soil association consists of intermittent "clay" bluffs and of gently sloping to rolling ridges that roughly parallel the Lake Michigan shoreline. Most of this soil association is well-suited to farming, but erosion control is needed on the sloping soils, and drainage and protection from flooding are needed for the soils in the low areas.

3.22.2 Soil Impacts

None identified.

3.22.3 Measures to Mitigate Adverse Soil Impacts

None identified.

3.23 Cemeteries

3.23.1 Affected Environment

No cemeteries are located adjacent to the study-area freeway system. However, a historic Native American cemetery is reportedly located north of Watertown Plank Road and east of Underwood Creek Parkway. Field survey in 2008 found no evidence of this site. In addition, a complex of three cemeteries, known as Potter's Fields, is located north of Wisconsin Avenue near 87th Street and north of Watertown Plank Road near 87th Street. Milwaukee County used these three cemeteries to bury patients and residents of county facilities in the 19th and 20th centuries.

3.23.2 Cemetery Impacts

None identified.

3.23.3 Measures to Mitigate Adverse Cemetery Impacts

None identified.

3.24 Archaeological

3.24.1 Affected Environment

WisDOT coordinated archaeological investigations in the study area in accordance with the Guidelines for Public Archaeology in Wisconsin, as revised. The archaeological investigations were designed to partially fulfill responsibilities for identifying, recording, and managing cultural resources as stipulated under Section 106 of the National Historic Preservation Act of 1966. The Phase 1 investigation (identification) included an extensive literature search of published reports, site forms, and reports on previously recorded sites on file at regional libraries, historical societies, and the Wisconsin Historical Society. The Phase 1 investigation also included visual inspection, pedestrian field survey, surface collection, and shovel tests as needed to verify the presence or absence of archaeological material along the entire project corridor. The results are documented in *A Phase I Archaeological Investigation of the US 45, I-94, I-894/Zoo Interchange Study Corridor in Milwaukee, Wisconsin Project I.D. 1060-33-00* (March 2008 and January 2009 addendum). The APE for the archaeological study includes areas of reasonably anticipated direct and indirect impacts.

The archaeological fieldwork conducted in 2007 and 2008 revisited several previously identified archaeological sites. During the field investigations, no new archaeological resources, materials, or sites were encountered. The following previously reported archaeological sites are in or near the APE for the study area corridor:

- The Lyon Cache site is located east of Highway 100, on both sides of Underwood Creek in Hansen Park. The site is previously reported to have yielded approximately 250 flint implements. In 2001, UWM surveyed the site area but found no archaeological resources.

- The Underwood Creek Campsites are located east of Highway 100, on both sides of Underwood Creek in Hansen Park. The site was previously reported by Charles E. Brown and may be a duplicate of the Lyon Cache site. UWM investigated the site in 2001 but found no archaeological resources.
- The Highway 100 site is a prehistoric habitation site defined by a single projectile point fragment. The site is located between Highway 100 and US 45 in Underwood Creek Parkway. The northeast corner of the site is within the study area.
- An unnamed site, located in the southeast quadrant of the Watertown Plank Road interchange, is previously reported to have yielded lithic materials. Since the area is largely paved and used as a parking lot today, the site may be destroyed. No evidence of this site was located during 2007 investigations.
- The Powder House Camp is located north of I-94 and east of 92nd Street. The site is a previously reported campsite associated with 19th century Menominee short-term habitation. No trace of the site was encountered during 2007 investigations, and it appears that the site may be entirely destroyed by development.
- The Honey Creek Camp is located north of I-94 between 92nd Street and Honey Creek. Indications of cornfields and habitation areas were previously reported at the site. No evidence of the site was located during 2007 investigations, and indications are that the site has been heavily disturbed.

3.24.2 Archaeological Impacts

No-Build Alternative

The No-Build Alternative would not affect any identified archaeological sites.

Modernization Alternatives

None of the Modernization Alternatives would encroach into any of the identified archaeological sites.

3.24.3 Measures to Minimize Adverse Archaeological Impacts

None identified.

3.25 Historic Sites

3.25.1 Affected Environment

WisDOT investigated historic properties to identify possible historically significant structures within the APE of improvements to the study-area freeway system. The APE for this review included buildings and structures located within a 500-foot wide corridor on both sides of the study-area freeway system and a 0.5-mile radius around service interchange cross roads. Structures are historically significant if listed in the National Register of Historic Places or meet criteria for eligibility to the National Register. Eligibility criteria for structures are summarized as follows:

- Criterion A—Structures associated with events that have made a significant contribution to broad patterns of our history.
- Criterion B—Structures associated with the lives of persons significant in our past.
- Criterion C—Structures that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.

The six properties listed below are either eligible to be listed or are listed in the National Register. Detailed descriptions and exhibits of these historical properties are listed in Section 4, Draft Section 4(f) Evaluation.

The following two sites in the APE are listed in the national register (see **Exhibit 4-1**):

- The former Milwaukee County Home for Dependent Children Administration Building (currently the Milwaukee County Parks System headquarters), located north of Watertown Plank Road and east of the existing Watertown Plank Road entrance ramp to northbound US 45. This structure was listed in the National Register on January 17, 1999, was listed as a Milwaukee County Landmark in 1978, and is a City of Wauwatosa local landmark. The historical significance of this structure is based on Criterion A (Social History).
- The Milwaukee County School of Agriculture and Domestic Economy Historic District (Eschweiler Buildings), located just south of Swan Boulevard and east of US 45. The district was listed in the National Register on March 19, 1998, and is also a Milwaukee County and City of Wauwatosa landmark. The historical significance of this district is based on Criterion A (Education) and Criterion C (Architecture).

The following four sites in the APE are eligible for listing on the National Register (see **Exhibit 4-1**):

- Underwood Creek Parkway (including Hansen Park), which loosely follows Underwood Creek through the APE and crosses under US 45. The parkway is eligible for the National Register based on Criterion A (History).
- Greenfield Avenue Presbyterian Church is located on 97th Street, south of Greenfield Avenue and east of the I-894/US 45 exit ramp to Greenfield Avenue. This church is a good example of the English Colonial/Period Georgian Revival style of architecture. The church is eligible for the National Register under Criterion C (Architecture) with regard to Criterion Consideration G: Properties that have achieved their significance within the last 50 years.
- The triple intersection Warren through truss railroad bridge, located along the Union Pacific rail line over a former Canadian Pacific branch rail line, is south of I-94 and east of Highway 100. This single span rail bridge was built in 1910 and carries two sets of railroad tracks. This truss bridge is eligible for the National Register under Criterion C (Engineering).
- Honey Creek Parkway, the south end of which is on the north side of I-94 near 84th Street. The Honey Creek Parkway construction began in 1932 and in 1933 permitted the use of Civilian Conservation Corps labor. The parkway is eligible for the National Register based on Criterion A (History) and Criterion C (Architecture/Engineering).

3.25.2 Historic Site Impacts

Of the six historic properties in the Zoo Interchange APE, only the triple intersection Warren through truss railroad bridge may be directly impacted by the Zoo Interchange reconstruction. Proposed improvements and possible impacts to historical properties are described below.

Milwaukee County Home for Dependent Children Administration Building (current Milwaukee County Parks Department headquarters)

The existing US 45/Watertown Plank Road interchange would be reconstructed. The northbound entrance ramp would be closer to the building than it is today, but would not impact the historic boundary of the building. Watertown Plank Road would be reconstructed and realigned about 95 feet north to provide a safer and more efficient intersection with the freeway on/off ramps (see Section 4.3.5).

Milwaukee County School of Agriculture and Domestic Economy Historic District (Eschweiler Buildings)

The Swan Boulevard bridge over US 45 will be reconstructed, as will the Swan Boulevard connection to Watertown Plank Road. The existing Swan-Watertown Plank connector road is 421 feet west of the closest of the four buildings; after reconstruction, it would be approximately 343 feet away under both the 6- and 8-lane N3 Modernization Alternatives. Under the 6- and 8-lane N1 Modernization Alternatives, the Swan-Watertown Plank connector road would be in essentially the same location as it is today, moving only slightly closer to the north side of the buildings (approximately 3 feet) (see Section 4.3.6).

Underwood Creek Parkway

The existing US 45 bridge over Underwood Creek Parkway would be replaced by a wider bridge. The 123-foot-wide bridge would be approximately 50 feet wider after its reconstruction, which would require approximately 50 to 60 feet of new right-of-way or easement from Underwood Creek Parkway, east of the bridge. The 6-lane Modernization Alternatives would require 0.1 acre of new right-of-way or easement to accommodate the wider bridge. The 8-lane Modernization Alternatives would require 0.24 acre of new right-of-way or easement. The wider bridge will cross over the parkway and will not directly affect the parkway roadway. The small brick building in Underwood Creek Parkway is west of the bridge; it would not be any closer to the US 45 bridge over the parkway (see Section 4.3.1).

Greenfield Avenue Presbyterian Church

Under the Modernization Alternatives for the south leg (6- and 8-lane S2), I-894/US 45 will be reconstructed and potentially widened, including the existing exit/entrance ramps to/from Greenfield Avenue. The off-ramp to Greenfield Avenue will be approximately 20 feet east of the existing ramp and closer to the church property (250 feet away from the church rather than 270 feet today). The building's historic boundary would not be affected, and no church property would be acquired (see Section 4.3.8).

Union Pacific Railroad Triple Intersection Warren through Truss Bridge

The Union Pacific's modern railroad bridge over I-94 may be replaced by a new, longer bridge to accommodate the Zoo Interchange reconstruction. The Warren truss bridge is

located just south of the Union Pacific's modern railroad bridge over I-94. The Union Pacific rail line in the vicinity of I-94 may remain in its existing alignment or may be re-aligned approximately 30 feet to the east or west of its current location under all Modernization Alternatives. If the railroad stays on its existing alignment, the truss bridge would likely remain in service. If the railroad would need to be re-aligned, the truss bridge would be removed from service and replaced by a new bridge (see Section 4.3.7).

Honey Creek Parkway

The 84th Street interchange with I-94 would be reconstructed under the 6-lane and 8-lane E1 and E1/E3 Hybrid Alternatives. None of the Modernization Alternatives would require acquisition of Honey Creek Parkway for highway right-of-way. However, under all the alternatives, a stormwater detention pond may be built in the parkway just north of I-94 and west of 84th Street. The 4-acre pond would collect runoff from I-94 to reduce the potential for downstream flooding and to improve water quality in Honey Creek by allowing contaminants like dirt, salt, and oil to settle out of the runoff (see Section 3.11.3). To accommodate the pond, Honey Creek would be realigned and returned to a more natural streambed. The linear, concrete lined channel installed in the 1960s would be removed. The 84th Street bridge over Honey Creek would not be affected (see Section 4.3.4).

3.25.3 Measures to Mitigate Adverse Historic Site Impacts

WisDOT and FHWA are currently working with State Historic Preservation Office to assess the potential impacts to historic resources. Results of the ongoing coordination and resolution of requirements under Section 106 of the National Historic Preservation Act will be presented in this study's final environmental document. The final environmental document will not be approved until the Section 106 process has been completed.

3.26 Recreational Resources / Public Use Lands

3.26.1 Affected Environment

The City of Milwaukee, City of West Allis, Milwaukee County and Wisconsin DNR own parks and other public use areas adjacent to the study-area freeway system. See **Exhibit 3-25** for locations of these facilities.

Recreational Resources Adjacent to Study-Area Highways

Milwaukee County Zoo. The Milwaukee County Zoo is located in the northwest quadrant of the Zoo Interchange and shares a property line with freeway right-of-way on both the east and south sides of the property. The Milwaukee County Zoo is bordered by Bluemound Road to the north and Highway 100 to the west. A maintenance facility for the zoo is located in the southwest quadrant of the Zoo Interchange and is connected to the zoo via an underpass under I-94.

The Milwaukee County Zoo is owned by Milwaukee County and sits on over 200 acres of parkland. The Milwaukee County Zoo, at its present location, was opened to the public on May 13, 1961. Currently, the zoo is home to more than 1,700 mammals, birds, fish, amphibians, and reptiles with more than 350 species of animals on exhibit. Along with the animals on exhibit and their living habitat, the site contains a parking lot, Zoofari Conference Center, animal health center, conservation education center, a miniature train the travels around the zoo grounds, administration offices, food/picnic areas and gift shops, and other amenities. In spring 2008, the new U.S. Bank Gathering Place, a 23,000-square-foot covered atrium and entrance mall, was opened. The zoo is also home to many special events during the year including concerts, Zoo a la Carte, and large group gatherings.

Honey Creek Parkway. Honey Creek Parkway is a 90-acre parkway that follows Honey Creek from approximately I-94 at 84th Street in Milwaukee to the 70th Street/State Street intersection in Wauwatosa. Both Honey Creek Parkway and the 84th Street bridge over Honey Creek, located approximately 700 feet north of mainline I-94, are eligible for inclusion in the National Register. No Land and Water Conservation Funds (LWCF) or other special funds were used to acquire or develop Honey Creek Parkway.

Chippewa Park. Chippewa Park is a Milwaukee County Park located in Wauwatosa; it shares a property line with I-94 right-of-way. This 10.5 acre park is located at 11500 Park Hill Avenue, north of I-94 and west of the I-94/Highway 100 interchange. The park is bordered by Park Hill Avenue to the north and runs from approximately 114th Street on the west to 110th Street on the east.

Chippewa Park contains a walking path, two children's play areas, one basketball court and open areas with soccer goals. No LWCF funds or other special funds were used to acquire or develop Chippewa Park.

Underwood Creek Parkway. Underwood Creek Parkway is a 196-acre parkway owned by Milwaukee County. The parkway generally follows the path of Underwood Creek, intermittently, from approximately Rainbow Park at 116th Street in West Allis in the west to Swan Boulevard on the east. The Underwood Creek Parkway contains a tot lot just south of Bluemound Road and a segment of the Oak Leaf Trail is routed along the parkway. The Wil-O-Way Underwood Recreation Center is also considered part of Underwood Creek Parkway.

The Underwood Creek Parkway crosses the Zoo Interchange study area in two locations. On the north leg, the parkway crosses under US 45, north of Watertown Plank Road. Along the west leg, a small section of the parkway is located north of the I-94 right-of-way and resumes just south of I-94 near 124th Street (the parkway does not cross under I-94). Underwood Creek Parkway is eligible for the National Register based on the history criterion. No LWCF funds or other special funds were used to acquire or develop Underwood Creek Parkway.

Wil-O-Way Underwood Recreation Center. The Wil-O-Way Underwood Recreation Center is located at 10602 Underwood Creek Parkway in Wauwatosa. The Center shares a property line with US 45 right-of-way to the west and is located approximately one-quarter mile north of the Swan Boulevard overpass over US 45. The Wil-O-Way Underwood Recreation Center is a 77-acre facility owned by Milwaukee County and operated by the Milwaukee County Office for Persons with Disabilities.

The Wil-O-Way Underwood Recreation Center hosts recreation activities designed for people with disabilities through the Wil-O-Way Recreation Center. Activities offered on-site include arts, crafts, life skills, clubs, sports, a hiking trail and music. The Wil-O-Way Underwood Recreation Center includes an accessible demonstration garden, outdoor pergola, picnic area, basketball court, and wheelchair accessible state-of-the-art playground with "roll-in" sandbox. The center also contains a room that can be rented with a capacity of 150 people. No LWCF funds or other special funds were used to acquire or develop the Wil-O-Way Underwood Recreation Center. Goodwill Industries operates an adult day care program at the site, and Easter Seals operates a summer day camp for kids and adults with disabilities. UW-Extension offers master gardener classes, and UW-Milwaukee uses the grounds for camping.

Oak Leaf Trail. The Oak Leaf Trail is a Milwaukee County multi-use trail consisting of over 100 miles of multiple loops through all of the major parks and parkways in Milwaukee County's Park System. The trail is open to bikers, skaters, runners and walkers and consists of off-road paved trails, park drives and municipal streets where necessary to ensure continuity. No LWCF funds were used to acquire or develop sections of the Oak Leaf Trail located within the Zoo Interchange study area.

The Oak Leaf Trail crosses the Zoo Interchange study area in two locations. Along the north leg, the trail crosses under US 45 along the Underwood Creek Parkway. On the west leg, the trail crosses under I-94 between two segments of Underwood Creek Parkway. A connector to the main line of the Oak Leaf Trail, the East-West Connector, crosses under I-94 on 84th Street.

Hank Aaron State Trail. The HAST is a paved, multi-use trail owned by the Wisconsin Department of Natural Resources that currently runs through the Menomonee Valley from Milwaukee's lakefront to Miller Park, with plans to extend the trail to the Milwaukee/Waukesha County line. The existing trail is open to walkers, runners, bicyclists and skaters and provides and asphalt path from Miller Park to the Sixth Street bridge and the use of bike lanes and sidewalks to reach the lakefront. In 2006, the DNR acquired 5.5 miles of former Canadian Pacific Railway rail line that runs from Miller Park to the Milwaukee/Waukesha County line that would nearly double the length of the trail. This would allow for the HAST to provide a direct east-west trail across Milwaukee County along a continuous path, extending from the lakefront to the county line, where it would connect with the Oak Leaf Trail.

The future extension of the HAST would cross the study-area freeway system in two locations. The trail would cross under I-894/US 45 just south of the Zoo Interchange, and would also cross under I-94 near 116th Street. The trail would also cross under Highway 100 and the Union Pacific's Triple Intersection Warren through truss railroad bridge, which is just east of Highway 100 (see **Exhibit 2-6**).

The HAST extension has been acquired with Knowles-Nelson Stewardship funds and FHWA Congestion Mitigation Air Quality grants. The extension of the HAST is subject to the rail banking provisions of the 1983 National Trails System Act. This means that the corridor must be maintained so that it could be returned to use as a rail corridor, if needed, at some point in the future. WisDOT and the DNR developed a Memorandum of Understanding that lays out the details and responsibilities for the HAST's construction, maintenance and detours during Zoo Interchange construction.

West Allis Cross Town Connector. The West Allis Cross Town Connector Bicycle and Pedestrian Facility is a planned multi-use, 5-mile east-west trail that would link schools, businesses, and other regional trails. The Cross-Town Connector would cross under I-894/US 45 along the Union Pacific rail line located between Greenfield Avenue and Lincoln Avenue, approximately one-half mile south of Greenfield Avenue.

DNR Forestry Science Center. DNR's Forestry Science Center and Demonstration Forest is just east of US 45 between Swan Boulevard and Underwood Creek Parkway. This 67-acre site includes a 50-acre mature hardwood upland forest, dominated by large, old red and white oaks, as well as large sugar maple trees, which will form the centerpiece for the Forestry Science Center. Unforested land will be used for the building and demonstration areas. Land for the Forestry Science Center was purchased through Wisconsin's Knowles-Nelson Stewardship Fund.

The mission of the center will be to promote awareness of the benefits of sustainable forestry in Wisconsin. The center will provide an educational focus on sustainable management of a hardwood forest, reforestation efforts, the significance of wood products to Wisconsin's economy, and the value of sustainable forestry to the future of our forests. An education and awareness center will be constructed on site and will contain indoor and outdoor exhibits and programming, focusing on informing the public about Wisconsin's nationally recognized forestry programs. It will provide urban forestry experiences and activities for school children, parents and visitors to the area. The Center will also link with Wisconsin's LEAF (Wisconsin's K-12 forestry curriculum) – teaching science, history, math, and social studies.

DNR has been working with MMSD, City of Wauwatosa, and Milwaukee County to ensure the center's compatibility with surrounding lands. The DNR will continue working with these partners, along with the education and forestry communities, to finalize plans for program development, fundraising, and exhibit, building, and landscape design.

Other Recreational Resources in the Study Area

Cannon Park. Cannon Park is located approximately 500 feet east of US 45 just north of the Zoo Interchange at 303 North 95th Street in Milwaukee. The 8.5-acre Milwaukee County park is bordered by Park Hill Avenue to the north, 93rd Street to the east, residences and an electrical substation to the south, and the Parkside Pool apartment complex to the west. The park contains a mix of woods and open space with two half-court basketball courts, picnic area, soccer field, tot lot, and the Cannon pavilion, a maximum capacity 50 person meeting area available for rent.

Hansen Park. Hansen Park is a 55-acre Milwaukee County Park located at 9800 Underwood Creek Parkway in Wauwatosa. Hansen Park has an 18-hole, par 3 golf course. Hansen Park is approximately 950 feet northeast of US 45 at its closest point. The park is located north of Underwood Creek Parkway and is bordered by both Underwood Creek Parkway and the Menomonee River Parkway. A Canadian Pacific rail line crosses through the park and the confluence of the Menomonee River and Underwood Creek is located in the northern part of the park.

Wisconsin Avenue Park. Wisconsin Avenue Park is an 18-acre park located in Wauwatosa, north of Wisconsin Avenue and approximately 0.4 mile west of US 45. The park is owned by Milwaukee County and contains a mix of woods and open space. Amenities include two

softball diamonds, one baseball diamond, tot lot, two group picnic areas, parking lot, park office, and a small creek that runs through the park.

Reservoir Park. Reservoir Park is located on the east side of I-894/US 45 at 9621 West Lapham Street in West Allis, approximately 0.25 mile south of Greenfield Avenue. Reservoir Park is located approximately 425 feet east of I-894/US 45 and is separated from the highway right-of-way by overhead electric transmission lines. The park is also bordered by West Lapham Street to the north, South 96th Street to the east, and the West Allis underground water reservoir and Union Pacific Railroad to the south.

Reservoir Park is owned by the City of West Allis and contains two baseball diamonds, two soccer fields and children's playground equipment.

LaFollette Park. LaFollette Park, owned by Milwaukee County, is an 18.4-acre park located one-quarter mile east of I-894/US 45 at 9418 W. Washington Street in West Allis. The park contains a pavilion for rent that can accommodate up to 75 people, three softball diamonds, three tennis courts, a tot lot, wading pool, reservable picnic areas and two basketball courts.

Dyer Playfield. Dyer Playfield, owned by the City of Milwaukee, is located at 151 North 80th Street in the City of Milwaukee. The playfield is located near the I-94/ 84th Street interchange, approximately 0.3 mile north of I-94 and 0.2 mile east of 84th Street. The seven-acre Dyer Playfield consists of a children's play area, three baseball/softball fields, a basketball court, a soccer field, and three tennis courts.

Kopperud Park. Kopperud Park is located approximately 0.25 mile south of I-94 at the corner of 76th Street and Pierce Street. This City of West Allis park contains trees and picnic tables.

3.26.2 Recreational Resource/Public Use Land Impacts

No-Build Alternative

The No-Build Alternative would not acquire land from any parks or recreational resources. The study-area freeway system would not be any closer to any parks or recreational facilities under the No-Build Alternative.

Modernization Alternatives

All of the Modernization Alternatives would require acquisition of parkland for the proposed improvements. The 6-lane Modernization Alternatives would require 15 to 16 acres of parkland from three parks. The 8-lane Modernization Alternatives would require 16 acres from three or four parks adjacent to the study-area freeway system. For the specific impacts associated with recreational resources and public use land adjacent to the study-area freeway system see Section 4.

North Leg. The Modernization Alternatives would acquire 0.1 (6-lane) to 0.24 (8-lane) acre from Underwood Creek Parkway. All Modernization Alternatives would acquire approximately 0.5 acre from the south end of the Wil-O-Way Underwood Recreation Center. The right-of-way acquisition would not affect play equipment, pool, or building. Under the 8-lane Modernization Alternatives, US 45 would be 53 feet closer to the playground (29 feet versus 82 feet today). Under the 6-lane Modernization Alternative, US 45 would be 40 feet closer to the playground (42 versus 82 feet today). US 45 would be

156 feet (8-lane) and 168 feet (6-lane) from the Wil-O-Way building. Today the building is 213 feet from US 45.

TABLE 3-25
Parkland Impacts by Alternative (Acres)

Alternatives	Park
6-lane core	15.0 acres from Milwaukee County Zoo
8-lane core	15.3 acres from Milwaukee County Zoo
6-lane W3	0.1 acre from Chippewa Park
8-lane W3	0.2 acre from Chippewa Park
6-lane N1/N3	0.1 acre from Underwood Creek Parkway and 0.5 acre from Wil-O-Way Underwood Recreation Center
8-lane N1/N3	0.2 acre from Underwood Creek Parkway and 0.5 acre from Wil-O-Way Underwood Recreation Center

In March 2009, WisDOT met with the Milwaukee County Office for Persons with Disabilities, Goodwill Industries, Easter Seals, and UW-Extension to discuss potential impacts to Wil-O-Way. The primary concern was noise impacts to the outdoor recreation area, especially for autistic children and elderly for whom overstimulation from noise is a concern. Blind people, who rely more heavily on their sense of hearing, would find it more difficult to use the outdoor recreation areas. See Appendix D, page D-36 and Section 4.

No right-of-way would be acquired from the DNR Forestry Science Center, although US 45 would be closer to the center under the Modernization Alternatives than it is today. However, under both alternatives, the view of and from the center would not change. Viewers of the center from US 45 would continue to see trees in the southwest corner of the center and the views from the center would not be changed, in part because the elevation or US 45 in this area is located below that of the Forestry Science Center. No noise receptors were located in the Forestry Science Center adjacent to US 45. The nearest receptor, located on the Wil-O-Way Underwood Special Recreation Center property, showed a 1dBA increase in traffic noise for both 8-lane Modernization Alternatives at this location.

West Leg. Both the 6-lane and 8-lane Modernization Alternative W3 would acquire land from Chippewa Park. The 6-lane W3 Alternative would acquire 0.1 acre in a 5- to 15-foot-wide strip of land from the southeast side of the park, along the westbound I-94 entrance ramp from Highway 100. The 8-lane W3 Alternative would acquire 0.2 acre from a 15- to 25-foot-wide strip of land in the same location. At the west end of the park, I-94 would be located approximately 75 feet away from the park, approximately 20 feet closer than I-94 is today.

Reconstructing the Highway 100 interchange will move the interchange ramps adjacent to the HAST right-of-way, but no right-of-way acquisition is anticipated. The view from the HAST alignment could change as vehicles would be moved closer to the trail near Highway 100. Future noise levels modeled at a location just south of the HAST where the eastbound I-94 Highway 100 ramps will be located show a 3 dBA decrease in future traffic noise levels for the 8-lane Modernization Alternative. Overhead electrical transmission lines would be moved adjacent to the trail between Highway 100 and US 45. The five bridges that carry US 45 over the HAST would be replaced by 5 to 6 bridges in the same general location. Additionally, Highway 100 and the Union Pacific Railroad over the future HAST may be reconstructed.

There would be no highway right-of-way acquisition from Underwood Creek Parkway. A stormwater retention/detention pond may be built in the parkway to manage runoff from the freeway. If the pond is built, WisDOT and FHWA would remove the park roadway and relocate the Oak Leaf Trail to a location suitable to the Milwaukee County Parks department.

East Leg. There would be no highway right-of-way acquisition from Honey Creek Parkway. A 1- to 1.5-acre stormwater retention/detention pond may be built in the parkway west of 84th Street to manage runoff from the freeway (see Section 4).

South Leg. The West Allis Cross Town Connector has not been built nor has its route been precisely determined. If and when the route is finalized, WisDOT will work with the City of West Allis to ensure I-894/US 45 and the Connector are compatible. If the trail is built prior to reconstruction of the bridge carrying I-894/US 45 over the Connector, the trail will be closed during the bridge's construction.

Core Interchange. All Modernization Alternatives would acquire the 5.56-acre zoo maintenance facility in the southwest quadrant of the existing Zoo Interchange, the Zoofari Conference Center, and 3.6 acres of the 5.51-acre overflow parking lot along US 45. None of the Modernization Alternatives would affect the zoo's animal exhibits.

The loop ramp connecting westbound I-94 to the Greenfield Avenue exit off I-894/US 45 would be located approximately 11 feet from the southeast corner of the zoo. The 6-lane N1 Alternative would acquire 0.5 acre from the south edge of the zoo, while the 8-lane N1 and N3 Alternatives would acquire 0.8 acre. In total, the Modernization Alternatives would acquire between approximately 15.0 and 15.3 acres of zoo property for new right-of-way.

Several overhead transmission lines would be relocated on the west side of the core. Three options are under evaluation. Under one option, no overhead transmission lines would be adjacent to the zoo. The other two options involve one or two overhead electrical transmission lines, potentially being relocated to the north side of I-94 adjacent to the zoo. If one transmission line is located in this area it would be built close to I-94, but would still require a 50-foot-wide easement from zoo property, which may affect the vegetative buffer between I-94 and the zoo. If two transmission lines are built in this area a 130-foot-wide easement would be required and part of the vegetative screening between I-94 and the zoo would be permanently removed (see **Exhibits 3-26, 3-27, and 3-28**). As a result, the transmission lines may be visible from the zoo's miniature train and possibly from some animal exhibits. Zoo officials have indicated that if transmission lines are relocated to the north side of I-94, this would be a major visual impact to the zoo.

Several I-894/US 45 bridges will be reconstructed over the future HAST. Box culverts may be used instead of bridges. The construction of box culverts under the highway structures would limit the views from the HAST through the core of the Zoo Interchange. Under all Modernization Alternatives, trail users would have to travel under structures for a longer period of time through the core. Views of the HAST from the study-area freeways and ramps would not change since current views are limited since structures carry the roadways over the trail. Future noise levels along the HAST, as modeled at 5 locations just south of the trail along Bungalow Parkway, are expected to change any where from a 1dBA decrease to a 2 dBA increase as a result of the 8-lane Modernization Alternatives.

Stormwater Ponds. As part of the project, stormwater detention ponds may be constructed in the Honey Creek Parkway, Underwood Creek Parkway (on the west leg) and on the County Grounds near the Milwaukee County Parks Building. These ponds would not be converted to new highway right-of-way and the Milwaukee County Parks Department could retain control of this land.

For Honey Creek parkway, up to 4 acres of the parkway, west of 84th Street, may be converted to a 1- to 1.5-acre stormwater retention/detention pond. To construct the pond, trees would be removed, and the concrete lined stream bed would be re-aligned. The re-aligned stream would have a more natural look than the existing concrete-lined channel, which was constructed in the 1950s and 1960s, and improve the creeks ability to support fish and wildlife. The pond would be dry at times and hold water for a period of time after rainfalls.

The Underwood Creek Parkway stormwater detention pond along the west leg would be approximately 5 acres. This pond would be located south of I-94. The stormwater detention pond near the historic Milwaukee County's parks headquarters would be approximately 3 acres and be located between the building and US 45. It would not affect parkland.

The project team met with Milwaukee County Parks staff in November 2008 and February 2009, to discuss the stormwater ponds. Milwaukee County Parks' staff was supportive of the concept of using existing park land for the stormwater detention ponds, pending further design and County Board approval.

No land in the study area is enrolled in the Natural Resources Conservation Service's Conservation Reserve Program.

3.26.3 Measures to Mitigate Adverse Recreational Resource / Public Use Land Impacts

Please see Section 4 for mitigation measures for Underwood Creek Parkway/Oak Leaf Trail /Wil-O-Way Underwood Recreation Center, Milwaukee County Zoo, Chippewa Park, and Honey Creek Parkway.

WisDOT will work with DNR to develop a suitable connection between the built portion of the HAST and the Oak Leaf Trail until full HAST construction is complete, following Zoo Interchange construction.

If and when the West Allis Cross Town Connector route is finalized, WisDOT will work with the City of West Allis to ensure that I-894/US 45 and the Connector are compatible. If the trail is built prior to reconstruction of the bridge carrying I-894/US 45 over the Connector, the trail will be closed during the bridge's construction, and WisDOT will work with the City of West Allis to devise a detour route.

3.27 Construction

3.27.1 Construction Costs

All construction costs presented in this document have been calculated to account for inflation between 2009 and the end of the multi-year construction that WisDOT has scheduled to begin between 2012 and 2015. WisDOT and FHWA assumed a 4-percent annual inflation rate.

No-Build Alterative

The No-Build Alternative would not incur construction costs. However, the study-area freeway system would eventually have to be replaced.

Replacing the study-area freeway system in its current configuration would cost an estimated $960 million in year-of-construction dollars.

Modernization Alternatives

The immediate economic impact of the Modernization Alternatives would be expenditure of state and federal funds to reconstruct the study-area freeway system. **Table 3-26** summarizes the construction costs.

TABLE 3-26
Construction Cost (in $ millions)[6]

	N1	N3	E1	E1 w/ combined service drive	E1/E3 hybrid	S2	S2 w/ EB I-94 access to Greenfield Ave.	W3	Core
6-lane	$630	$710	$270	$270	$270	$160	$170	$190	$820
8-lane	$710	$740	$280	$280	$300	$160	$170	$190	$910

The 8-lane Modernization Alternatives would cost an estimated $2.25 billion to $2.31 billion in year-of-construction dollars. This amount includes real estate acquisition, design costs, construction, and a contingency.

The 6-lane Modernization Alternatives would cost an estimated $2.07 to $2.16 billion in year-of-construction dollars. This amount includes real estate acquisition, design costs, construction, and a contingency.

3.27.2 Operation and Maintenance Cost

No-Build Alternative

The economic impact of the No-Build Alternative would be the long-term cost of maintaining the existing study-area freeway system, including pavement resurfacing or replacement, and bridge rehabilitation or replacement. Increased traffic volumes, particularly heavy trucks, would contribute to the frequency of required pavement maintenance. The public and local governments would experience increased costs associated with crashes compared to the Modernization Alternatives.

Modernization Alternatives

Maintenance costs under the Modernization Alternatives would be less than for the No-Build Alternative because the pavement and bridges would be new.

In the long-term, maintenance costs for the 8-lane Modernization Alternatives would be higher than for the 6-lane Modernization Alternatives because it requires more pavement to maintain (8 lanes versus 6 lanes), resurface, and eventually replace. Snow removal cost would be higher for the 8-lane than the 6-lane Modernization Alternative.

[6] All costs are rounded to the nearest $10 million. As a result, the 6-lane and 8-lane costs for the south and west legs appear to be the same; however, the 6-lane Modernization Alternative would be slightly less expensive than the 8-lane Modernization Alternative.

3.27.3 Construction Employment

Substantial economic impacts would result from the Modernization Alternatives compared to the No-Build Alternative. These impacts may be measured by increases in state output/economic activity, employment, and job earnings. Construction expenditures would occur over the duration of construction, directly creating new demand for construction materials and jobs. These direct impacts would lead to indirect or secondary economic impacts, as output from other industries increases to supply the construction industry. The direct and indirect impacts of construction expenditures cause firms in all industries to employ more workers, leading to induced impacts as the additional wages and salaries paid to workers lead to higher consumer spending, creating new demand in many other economic sectors.

TABLE 3-27
Construction Noise/Distance Relationships

Distance From Construction Site (feet)	Range of Typical Noise Levels (dBA)
25	82–102
50	75–95
100	69–89
200	63–83
300	59–79
400	57–77
500	55–75
1,000	49–69

Sources: U.S. EPA and WisDOT

The construction job opportunities for this project will consist of a combination of new jobs and shifting of existing construction jobs to this project. The types of construction jobs required for this project include:

- Concrete workers
- Truckers
- Heavy equipment operators
- Electricians
- Iron workers
- General laborers
- Engineers
- Landscapers

3.27.4 Construction Impacts

This discussion pertains to the Modernization Alternatives. If the No-Build Alternative is selected, no construction impacts, other than regular maintenance, would occur in the short term. However, WisDOT would perform maintenance on the study-area freeway system more frequently and eventually replace it, resulting in periodic lane closures, construction noise, dust, and other impacts as portions of freeway are replaced.

Noise

Noise will be generated by construction equipment used to reconstruct the study-area freeway system. Typical construction equipment would include dump trucks, graders, cranes, bulldozers, pile-driving equipment and pavement construction equipment. The noise generated by this construction equipment will vary greatly, depending upon the equipment type and model, mode and duration of operation, and specific type of work effort; however, typical noise levels may occur in the 75 to 95 dBA range (at 50 feet). Other distance-typical noise level ranges are shown on **Table 3-27.**

Variations in building setbacks and land use, local intensity of specific construction activities, and sequencing and timing of construction will result in varying degrees of exposure to construction noise and hence varying levels of resulting impacts. Adverse effects related to

construction noise are anticipated to be of a localized, temporary, and transient nature. Construction noise will be controlled in accordance with WisDOT FDM Procedure 23-40-1. In locations where noise walls currently exist, WisDOT will also make every effort to construct new noise walls prior to the demolition of the existing noise walls.

To reduce the potential impact of construction noise, special WisDOT provisions for this project will require operation of motorized equipment in compliance with all applicable local, state and federal laws and regulations relating to noise levels permissible within and adjacent to the project construction site. All motorized construction equipment would be required to have mufflers constructed in accordance with the equipment manufactures specifications or a system of equivalent noise reducing capacity. WisDOT would also require that mufflers and exhaust systems be maintained in good operating condition, free of leaks and holes.

Air Quality (Emissions and Dust)

Demolition and construction activities can result in short-term increases in dust and equipment-related particulate emissions in and around the project area. Equipment-related particulate emissions could be minimized if the equipment is well maintained. The potential air quality impacts will be short-term, occurring only while demolition and construction work is in progress and local conditions are appropriate.

Air quality impacts during construction would be generated by motor vehicle, machinery and particulate emissions resulting from earthwork and other construction activities. Construction vehicle activity and the disruption of normal traffic flows may result in increased motor vehicle emissions within certain areas. Construction vehicle emission impacts could be mitigated through implementing and maintaining a comprehensive traffic control plan, enforcing emission standards for gasoline and diesel construction equipment and stipulating that unnecessary idling and equipment operation is to be avoided.

Several air quality construction mitigation best practices are available to assist in reducing diesel emission impacts from construction equipment. Off-road diesel engines can contribute significantly to the levels of particulate matter and nitrogen oxides in the air. In recent years, U.S. EPA has set emissions standards for engines used in most new construction equipment. However, construction equipment can last for a long time and it may take several years before all equipment is equipped with engines that meet U.S. EPA standards. In order to combat this, several strategies can be implemented to reduce emissions from the older engines that are in operation today.

Reductions in pollutant emissions from older off-road diesel engines can be obtained through a variety of strategies including: reducing idling, properly maintaining equipment, using cleaner fuel, and retrofitting diesel engines with diesel emission control devices. By reducing unnecessary idling at the construction site, emissions will be reduced and fuel will be saved. Proper maintenance of the diesel engine will also allow the engine to perform better and emit less pollution through burning fuel more efficiently. Switching to fuels that contain lower levels of sulfur reduces particulate matter. Using ultra-low sulfur diesel does not require equipment changes or modification. Using fuels that contain a lower level of sulfur also tends to increase the effectiveness of retrofit technologies. Retrofitting off-road construction equipment with diesel emission control devices can reduce particulate matter,

nitrogen oxides, carbon monoxide or hydrocarbons, in addition to other air pollutants. Diesel particulate filters can be used to physically trap and oxidize particulate matter in the exhaust stream and diesel oxidation catalysts can be used to oxidize pollutants in the exhaust stream. In the final design phase, WisDOT will consider including these measures on a voluntary or mandatory basis (U.S. EPA, 2008b).

Fugitive dust impacts generated by construction would be mitigated by standard dust control measures. These measures may include the frequent watering of construction sites that have large expanses of exposed soil, watering debris generated during the demolition of existing structures, washing construction vehicle tires before they leave construction sites and securing and covering equipment and loose materials prior to travel.

Dust control during construction would be accomplished in accordance with WisDOT's *Standard Specifications for Road and Bridge Construction* (2009b), which require the application of water or other dust control measures during grading operations and on haul roads. The location and operation of concrete batch plants would be in accordance with the Standard Specifications, and any special provisions developed during coordination with the DNR regarding air quality standards and emissions. Any portable material plants would be operated in accordance with DNR air quality requirements/guidelines. Demolition and disposal of residential or commercial buildings is regulated under DNR's asbestos renovation and demolition requirements (Wisconsin Administrative Code, Chapter NR447).

In February 2009, WisDOT received a $750,000 grant from U.S. EPA Region 5's Midwest Clean Diesel Initiative. WisDOT will use the grant money to assist contractors, who bid on projects in southeastern Wisconsin during the 2006 through 2008 calendar years, in repowering their older unregulated non-road diesel engines from Tier 0 emissions to Tier 1, Tier 2, or Tier 3 emission levels. The grant money could provide up to 50 percent of the cost of an engine repower, not to exceed $20,000. These non-road construction engines, because of the seasonal nature of construction in Wisconsin, are retained in the fleet for many years. Therefore, repowering this construction equipment with cleaner burning diesel engines will create long lasting emission reductions from WisDOT construction projects in southeast Wisconsin.

Traffic/Conceptual Construction Staging

Construction Related Traffic Diversion. During construction traffic will be diverted from the study-area freeway system, especially when Zoo Interchange ramps are closed for extended periods. Other freeways and local streets will experience increased traffic volumes as a result. After the construction staging plan is developed WisDOT will analyze how much traffic would be diverted from the study-area freeway system and the routes the traffic would divert to.

Several local streets adjacent to the study-area freeway system such as Highway 100, 84th Street, 76th Street, Greenfield Avenue and Bluemound Road, would experience an increase in traffic as a result of vehicles diverting from the study-area freeway system.

Transit, Pedestrian, and Bicycle Impacts. MCTS Freeway Flyer routes that use the study-area freeway system would be able to pass through the Zoo Interchange using normal routes. Some system ramps in the Zoo Interchange may be closed, requiring Freeway Flyer routes that use these ramps to divert to another route during construction.

Local street closures and entrance and exit ramp closures may require bus route modifications. MCTS routes that pass over or under the study-area freeway system on North Avenue, Watertown Plank Road, Bluemound Road, Greenfield Avenue, Highway 100, 92nd Street, 84th Street, and 76th Street may have to be modified if these local streets are closed during construction at locations that pass over or under I-94.

Pedestrians and bicyclists that cross over or under the study-area freeway system may need to temporarily modify their routes during construction. As noted previously, local street closures would be staged to minimize or avoid closure of adjacent streets at the same time.

Measures to Mitigate Adverse Effects. During the design phase, WisDOT and FHWA would evaluate the diversion routes to determine if improvements to these routes are necessary. In addition to roadway improvements, signal timing modifications, temporary signals, parking restrictions, intersection improvements, incident management, and demand management options may be instituted during construction to ease potential congestion and delay.

Freeway and local street lane closures would be staged to ease disruptions to the extent possible. Other mitigation measures may include the following:

- Holding workshops to determine methods to reduce the effects of construction on area businesses, residents, commuters, community services, and special events.
- Implementing a community involvement plan to inform the public, including radio, internet, print, and television.
- Encouraging the use of transit and carpooling through advertising, temporarily reduced rates, additional routes, and expanded or new park-and-ride lots.
- Encouraging businesses to modify their work schedules and/or shipping schedules to avoid peak traffic hours.
- Improving detour routes and other routes due to increased traffic resulting from construction.

Water Quality/Erosion

Construction in and near waterways would be performed in accordance with WisDOT's *Standard Specifications for Road and Bridge Construction* (2009b), and Wisconsin Administrative Code Chapter TRANS 401—Construction Site Erosion Control and Stormwater Management Procedures, and the WisDOT/DNR Cooperative Agreement. Appropriate techniques and best management practices, as described in the WisDOT Facilities Development Manual, would be employed to prevent erosion and to minimize siltation to environmentally sensitive resources in the project area. Erosion control devices would be installed before erosion-prone construction activities begin.

There is potential for erosion during construction as soils are disturbed by excavation and grading. The project would use standard erosion control devices and best management practices to reduce and control the deposit of sediment into environmentally sensitive resources before erosion-prone construction begins. The construction contractor will be required to prepare an Erosion Control Implementation Plan that includes all erosion control commitments made by WisDOT while planning and designing the project. The construction plans and contract special provisions must include the specific erosion control

measures agreed on by WisDOT in consultation with DNR. DNR reviews the Erosion Control Implementation Plan.[7] The following measures may be used during construction:

- Minimizing the amount of land exposed at one time
- Silt fencing
- Sedimentation traps
- Dust abatement
- Turbidity barriers
- Street sweeping
- Inlet protection barriers
- Temporary seeding
- Erosion mats
- Ditch or slope sodding
- Seeding and mulching exposed soils

Under revisions to the WisDOT/DNR Cooperative Agreement, *Memorandum of Understanding on Erosion Control and Stormwater Management*, following construction disturbed land would be re-seeded with a mix of fast growing grasses. Drainage systems would be maintained, restored or re-established in a manner that would not impound water.

Additional impact mitigation techniques during construction would include the following, as needed, at a particular location:

- If dewatering is required, dirty water would be pumped into a stilling, or settling, basin before it is allowed to re-enter a stream.

- Trenched-in erosion bales would be installed in areas of moderate velocity runoff; clean-aggregate ditch checks would be installed in ditches with moderate to high velocity runoff during and after construction; and ditches would be protected with erosion bales and matting in conjunction with seeding.

- Storing and fueling of construction equipment would be done in upland areas, away from environmentally sensitive areas. Accidental spills during refueling at construction sites or as a result of an accident involving hazardous material haulers would be handled in accordance with local government response procedures. First response would be through local fire departments and emergency service personnel to ensure public safety and to contain immediate threats to the environment. Depending on the nature of the spill, the DNR would then be notified to provide additional instructions regarding cleanup and restoration of any affected resources. The cost of cleanup operations is the responsibility of the contractor or carrier involved in the spill. Further, WisDOT's *Standard Specifications* state that public safety and environmental protection measures shall be enforced by the construction contractor (WisDOT, 2008b).

- Contractors would be required to follow DNR guidelines for ensuring that construction equipment used in or near waterways is adequately decontaminated for zebra mussels and plant exotics including purple loosestrife and Eurasian milfoil.

[7] Erosion Control will be implemented in accordance with the WisDOT Facilities Development Manual, Chapter 10, Erosion Control and Stormwater Quality; Wisconsin Administrative Code Chapter TRANS 401, Construction Site Erosion Control and Stormwater Management Procedures for Department Actions; and the WisDOT/DNR Cooperative Agreement Amendment, Memorandum of Understanding on Erosion Control and Stormwater Management.

Section 3.11 provides additional information regarding water quality mitigation and best management practices.

Vibration

Ground-borne vibration has the potential to affect nearby buildings. Blasting and impact pile driving are traditionally associated with high levels of vibration. Excavation and backfilling can generate vibration that is perceptible or noticeable in nearby buildings.

Vibration created by the movement of construction vehicles such as graders, loaders, dozers, scrapers and trucks are generally the same order of magnitude as the vibration caused by heavy vehicles traveling on streets and highways. In general, groundborne vibration from vehicles on streets is not sufficient to impact adjacent buildings.

Buildings that are in good structural condition would likely not be affected by construction-related vibration. WisDOT will coordinate with adjacent property owners prior to construction to determine if any buildings near construction areas are in poor structural condition. For construction work that occurs in the City of Milwaukee, WisDOT will meet City of Milwaukee vibration ordinances. In communities that do not have vibration ordinances, WisDOT will comply with the Wisconsin Department of Workforce Development (formerly Department of Industry, Labor and Human Relations) vibration regulations.

Material Source/Disposal Sites

The construction contractor is responsible for the selection of material source sites. Material would most likely be obtained from local existing quarry sites. Unusable excavated material would be disposed of by the contractor in accordance with WisDOT's *Standard Specifications for Road and Bridge Construction*, or special provisions to ensure protection of wetlands and waterways. Local zoning, reclamation plans, and other approvals may be needed for material source/disposal sites (WisDOT, 2009b).

Soil and excavated material (including vegetation) would be stockpiled or disposed of in an upland area, away from wetlands, streams, and other open water; and, where applicable, silt fence would be placed between the disposal area and wetland and open water areas.

If any material sources are necessary to construct the project, appropriate erosion control measures would be applied to these sites during and following construction; and following use, such sites would be properly seeded, mulched, and protected from erosion.

Any portable materials plants would be properly treated to prevent erosion, and DNR would be able to review site plans, including any gravel washing operations, high-capacity wells, and site closure/restoration.

3.28 Relationship of Local and Short-Term Uses Versus Long-Term Productivity

Highway construction projects require the investment or commitment of resources in the project area. Short-term uses refer to the immediate consequences of the project, while long-term productivity relates to direct and indirect effects on future generations.

The No-Build Alternative would involve minimal short-term and localized construction impacts associated with pavement and structure maintenance and spot safety improvements. However, projected traffic growth in the study area would further reduce the operational efficiency of the existing highway, reducing safety and mobility, and the possible loss of economic growth opportunities, both within the study corridor as well as outside it, reflecting the importance that this corridor holds on the region and state.

The short-term consequences of the Modernization Alternatives include the following:

- Committing public funds to construct the highway improvements. Because highway funding is derived mainly from vehicle user fees and motor fuel taxes, motorists using the highway ultimately pay for the improvements.
- Removing private properties, thereby reducing the local tax base.
- Converting residential and commercial land, wetland, and other uses to transportation uses.
- Displacing residences. Although displacement costs would be reimbursed through state and federal relocation assistance programs, displaced residents may relocate outside the project area, thus further reducing or shifting the local tax base.
- Acquiring right-of-way from some residential properties, which may result in non-conforming lot sizes and residences that are closer to the study-area freeway system.
- Increasing travel time and inconvenience for through and local traffic, area residents, and businesses during the construction period.
- Generating construction noise and dust that may affect residences, schools, and businesses near construction areas.

Long-term benefits of the Modernization Alternatives include the following:

- Reduced congestion and increased safety.
- Increased operational energy efficiency.
- Added roadway capacity to address future traffic demand (in the case of the 8-lane Modernization Alternatives only).

The local short-term impacts and use of resources by the Modernization Alternatives are consistent with maintenance and enhancement of long-term productivity.

3.29 Irreversible and Irretrievable Commitments of Resources

The No-Build Alternative would involve substantial commitments of resources to maintain the existing deteriorating pavement and structures and to make spot safety improvements. Under the Modernization Alternatives, land acquired for highway construction is considered an irreversible commitment during the time period such land is used for highway purposes. Considerable amounts of fossil fuel, labor, and highway construction materials such as cement, aggregate, and asphaltic material would be required. Considerable labor and natural resources would be used in the fabrication and preparation of construction materials. These resources generally are not retrievable. However, they are expected to remain in adequate supply.

Expenditure of public funds for construction of the Modernization Alternatives is considered an irretrievable commitment. In addition, land converted from private to public use would reduce local tax revenues.

As an alternative to total use of new resources, clean construction demolition materials and recycled cement or asphaltic materials will be considered. Depending on current technology at the time the project would be constructed, alternative types and sources of materials may be available.

The proposed commitment of resources is based on the concept that residents in the study area, region, and state would benefit by the improved quality of the highway. Benefits, which are expected to outweigh the commitment of resources, will include improved safety, preservation of an important transportation corridor, and reduced travel times, depending on the alternative selected.